PERSONAL COMPUTER OPPORTUNITIES FOR REMOTE COMPUTING SERVICES VENDORS IN WESTERN EUROPE

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INPUT Planning Services for Management

PERSONAL COMPUTER (PC) OPPORTUNITIES FOR REMOTE COMPUTING SERVICES (RCS) VENDORS IN WESTERN EUROPE

NOVEMBER 1983

PERSONAL COMPUTER (PC) OPPORTUNITIES FOR REMOTE COMPUTING SERVICES (RCS) VENDORS IN WESTERN EUROPE

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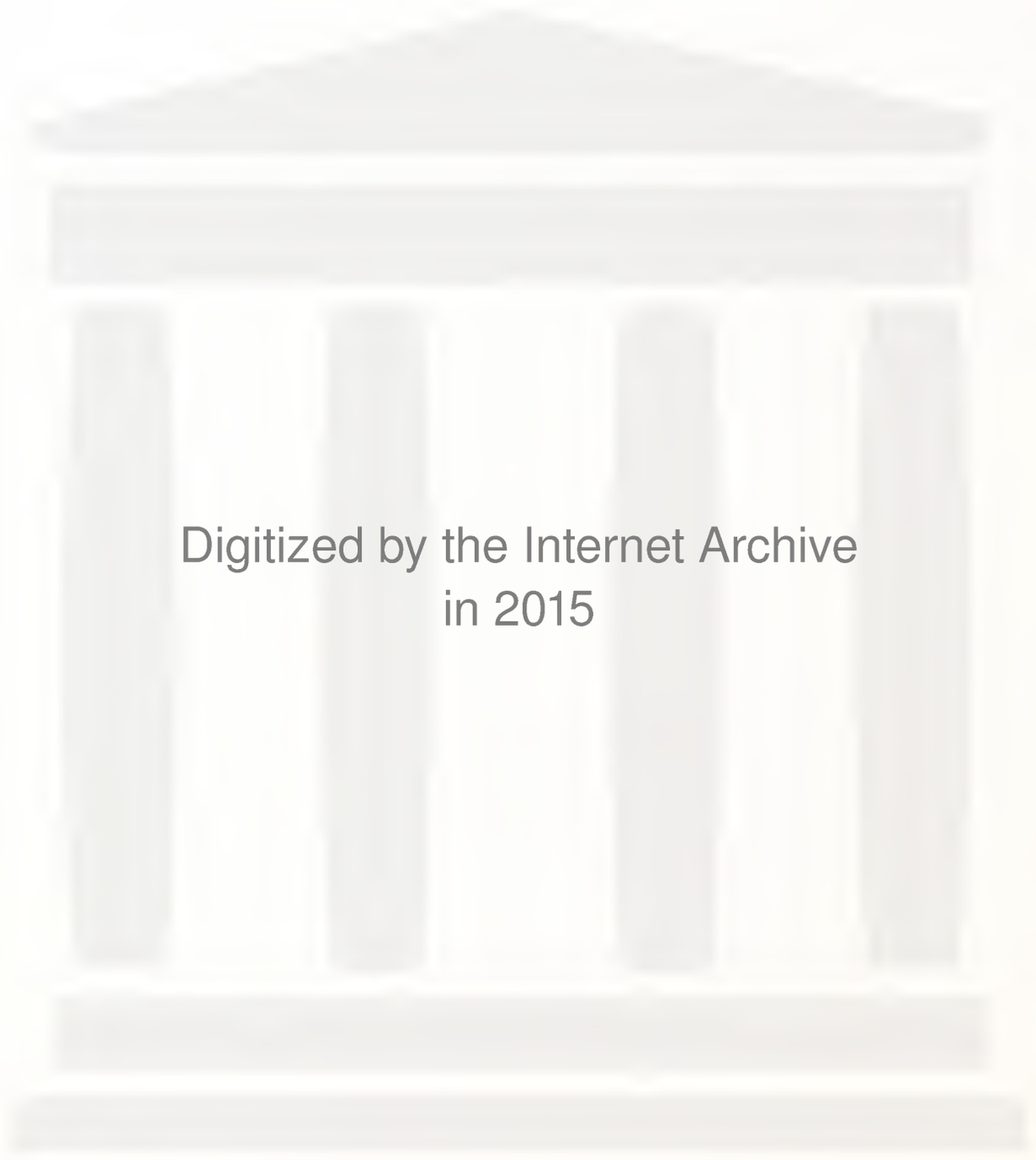


PERSONAL COMPUTER (PC) OPPORTUNITIES FOR REMOTE COMPUTING SERVICES (RCS) VENDORS IN WESTERN EUROPE

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

A. SCOPE

- In 1979 INPUT introduced a new category called User Site Hardware Services (USHS) into its classification of RCS delivery modes. This category was originally envisaged to include on-site offerings based on mini and small business computers, which had at that time started to appear in the U.S. marketplace (it now also encompasses PC-RCS offerings - see definitions in Appendix A).

- Today in Europe many vendors and users report a drift of services from external service bureaux onto in-house, minicomputer-based systems at departmental, divisional, and subsidiary company levels. Europe is currently experiencing this replacement trend as a strong force some four years behind the U.S.

- Meanwhile in the U.S., a new wave of small on-site machines, in the form of the personal computer (PC), has started to affect the RCS market, and INPUT in its companion volume to this report covering U.S. markets, has pointed to the need for an aggressive approach in meeting this challenge.

- The objectives of this report are to alert RCS vendors in the Western European theatre that they will not have four years to prepare their responses to this latest potential threat, and to present the findings of a survey designed to highlight the parameters within which strategies should be planned.

- Several important questions are examined:
  - To what extent are personal comptuers currently a threat to RCS revenues?
  - What strategies should vendors adopt to take advantage of the opportunities offered by the spread of PCs?
  - What products are being offered that combine the use of PCs and RCS, and how can this type of product be marketed effectively in the future?
- A number of other factors and issues are addressed:
  - Applications most vulnerable to PC erosion.
  - Future applications envisaged by PC users.
  - Factors affecting the changeover from one type of service to the other.
  - Sources of information and methodologies used in the evaluation of PCs prior to purchase.
  - Features most in demand for future mounting of applications on PCs.
  - User network plans for PCs and word processors.

B. METHODOLOGY

- The report is based upon an interview program that was undertaken in the four major country markets in Western Europe: France, the United Kingdom (U.K.), West Germany, and Italy.

- Over 100 user companies were interviewed, and a sample of 84 completed questionnaires went into the detailed analysis. A detailed profile of these users is given in Appendix B, and the User Questionnaire is included in Appendix D.

- A conscious effort was made to include users of both PCs and RCS in the user sample in order to gain insight into the different roles perceived for these two technologies and to study their interaction.

- Vendor interviews were conducted with 36 computer services companies, the majority of which (32) were in-depth, face-to-face. (See the Vendor Questionnaire in Appendix E.)

- Previous INPUT reports were utilised where relevant, and information from ongoing consultant market research activities was also incorporated. Discussions take place regularly with leading computer services industry figures.

C. REPORT STRUCTURE

- The remaining chapters of this report are organised to provide the following information:

  - Chapter II contains the Executive Summary, which summarizes findings, highlights key aspects, and concludes with definitive recommendations.

- Chapter III forecasts the markets in Western Europe for PC-based RCS services over a forecast period of 1983 and for the five years to 1988.

- Chapter IV presents the analysis of end users and end-user companies on the PC-RCS issue.

- Chapter V examines vendor attitudes and presents the findings of the survey of their current and future PC-based offerings.

- Chapter VI makes recommendations on the opportunities for future PC-based services in each of the major country markets researched.

- The appendices, besides containing the definitions, interview profiles and questionnaires previously mentioned, include at Appendix C a review of current trends in the technology as it affects developments of PCs, multi-user microcomputers and the emerging 32-bit based machines (sometimes named "supermicros").

- Also included are a list of related INPUT reports in Appendix F and a table of exchange rates in Appendix G.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- Note: this executive summary is designed in a presentation format in order to:

  - Help the busy reader quickly review key research findings.

  - Provide a ready-to-go executive presentation, complete with a script, to facilitate group communication.

- The key points of the entire report are summarized in Exhibits II-1 through II-10. On the left-hand page facing each exhibit is a script explaining its contents.

A. PC OPPORTUNITIES FOR RCS VENDORS

- Personal computers (PCs) represent a major challenge for remote computing services (RCS) vendors. From a near-zero base less than five years ago, business-oriented PCs have mushroomed to over 4 million installations worldwide. INPUT projects that by 1988 over 35 million units will have been sold.

- INPUT believes that positive strategies must be developed by RCS vendors to incorporate PCs into their service offerings. Meeting those challenges will require a significant commitment of management time and resources. Vendors who fail to make a proper commitment to PCs as a new services delivery vehicle will face severe consequences in the marketplace.

- INPUT's research report:

  - Describes the extent of the PC threat to RCS vendors.

  - Identifies user needs and attitudes concerning PCs and RCS.

  - Analyses current responses by RCS vendors to the PC challenge.

  - Provides recommendations concerning appropriate PC-related strategies for RCS vendors.

  - References a self-analysis methodology, detailed in the companion U.S. report, Personal Computer Opportunities for Remote Computing Services Vendors (June 1983), whose aim is to help RCS vendors gain helpful insights into their unique opportunities.

- The remainder of this presentation will provide highlights from INPUT's report.

PC OPPORTUNITIES FOR RCS VENDORS

- PCs a Major Challenge
  - Positive RCS Strategies Needed
  - Significant Commitment Required
- Research Scope
  - Extent of Threat
  - User Needs and Attitudes
  - RCS Vendor Responses
  - Recommendations
- INPUT ISIP REPORT - Companion Volume for the U.S.
  - References Self-analysis Methodology

B. PC-RCS TO BE 45% OF RCS BY 1988

- Personal-computer-related remote computing services expenditures will constitute a significant portion of total Western European RCS expenditures by 1988.

- From a relatively modest base of $80 million in 1983, INPUT forecasts that use of PC-related RCS (PC-RCS) will increase at an average annual growth rate (AAGR) of 86% to $1.8 billion by 1988.

- This growth is nearly seven times the 13% AAGR of all RCS for the same timeframe.

- PC-RCS will thus increase from almost 4% of total RCS expenditures in 1983 to an impressive 45% by 1988.

- Reasons for this dramatic growth include:

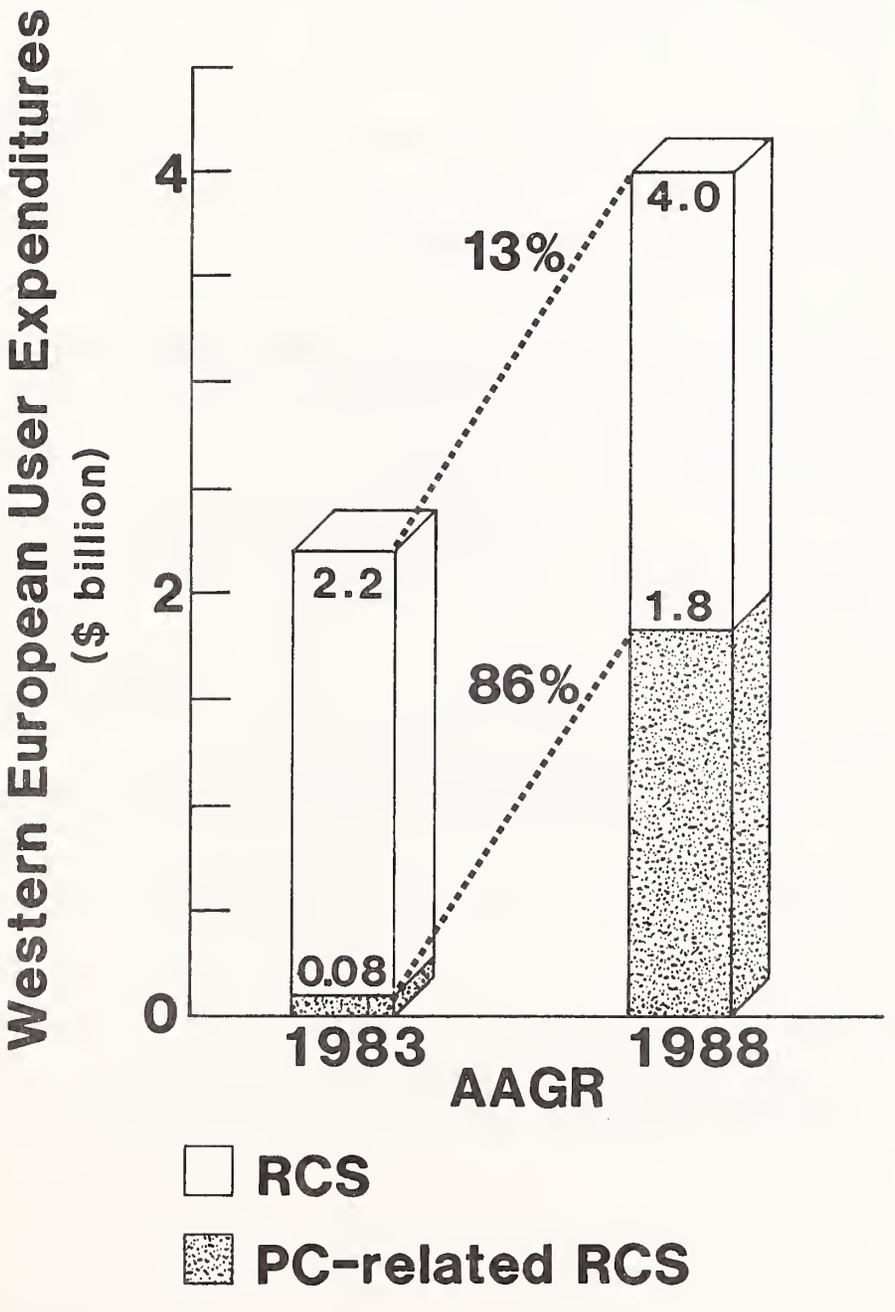
  - Increased acceptance of data processing as a viable productivity tool by millions of new PC users.

  - Heightened awareness that many critical computing needs go beyond the scope of PCs.

  - Creative exploitation by RCS vendors of their unique strengths to meet these increased computing needs.

- The following exhibits highlight many of these challenges and opportunities.

PC-RCS TO BECOME 45% OF RCS BY 1988



C. USERS ARE INCREASING PC USE AT RCS EXPENSE

- PC use is increasing rapidly among surveyed respondents. Seventy-four percent reported increased PC use compared to last year.

- In addition, 57% of these users planned to go on increasing expenditures and their use of PCs during the next 12 months.

- Information analysis (e.g., financial planning, budgeting, modeling and spreadsheet analysis) was the most frequently displaced application formerly run on RCS and is now the most frequently run on PCs.

- Of those surveyed almost 51% reported declines in RCS expenditures during the past year. Among those indicating declines, the average decrease was 8% of RCS expenditures.

- Forty-five percent of those reporting RCS declines stated it was due to its replacement by PCs.

- Users are planning to replace RCS by minicomputers (in 35% of declines) and then to link existing PCs into these new network controllers.

EXHIBIT II-3

USERS INCREASING PC USE AT RCS EXPENSE

PC Use

- 74% Increased in Past Year
- 51% Plan More Increases
- Information Analysis Is the Leading Ex-RCS Application

RCS Use

- 51% Reported RCS Declines
- 45% Said Decrease Due to PCs
- 35% Said Replacement Due to New PC-networking Minicomputers

D. MORE LOCAL COMPUTING AT LOWER COST

- When respondents were queried about the most important factors in the decision to acquire a PC (whether or not such an acquisition affected RCS expenditures), the three most frequently mentioned involved decreased costs and more local advantages.

  - Low cost is the most popular reason for obtaining a PC.

  - Second place went to local control. Users want to make their own decisions in a more timely and flexible way.

  - Users also considered suitability to a particular task a significant decision factor in opting for a PC.

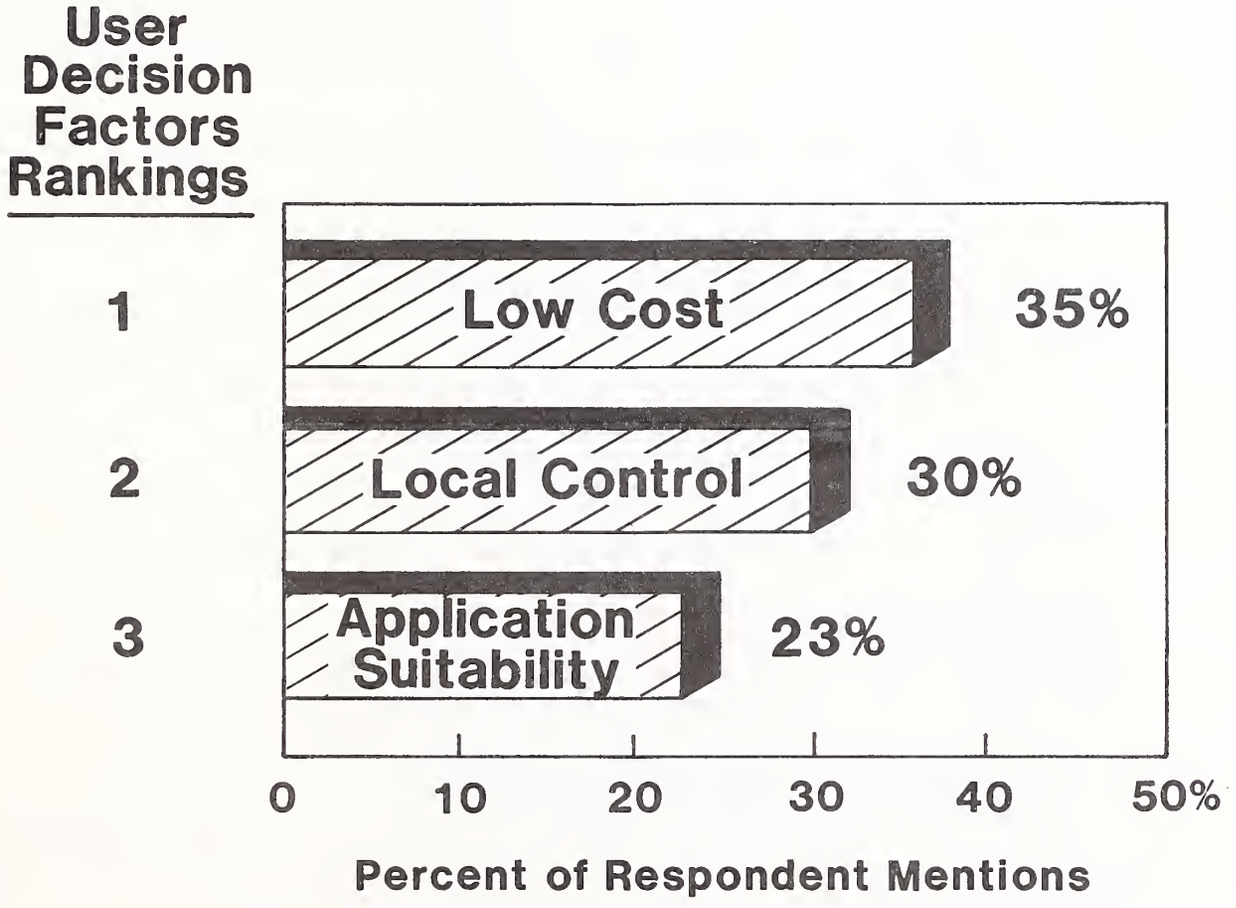
- It is interesting that these reasons closely parallel those formerly given to justify using RCS in place of in-house mainframe processing. PCs are simply taking many of the simpler RCS advantages one step further in both cost and convenience.

- Fortunately RCS vendors have the ability to counter this PC threat by emphasizing other strengths that PCs cannot address. To implement an effective PC-RCS strategy, however, it is very important that RCS vendors accurately understand current user attitudes.

EXHIBIT II-4

User Needs

MORE LOCAL COMPUTING AT LOWER COST



E. RCS VENDORS ARE MISPERCEIVING USERS' NEEDS

- Accurately understanding user needs is tricky. This survey revealed that many misperceptions exist. Vendors did not agree with users' contention that access to a company-wide data base was the most important feature. Instead, they emphasised two support areas: training and consultancy.

- While users rated provision of vendor maintenance as number two in importance, vendors placed it ninth.

- Communications play a more important role for users, and they differ with vendors on the detailed priorities:

  - Communications with remote departments was ranked fourth most important by users, but only tenth by vendors.

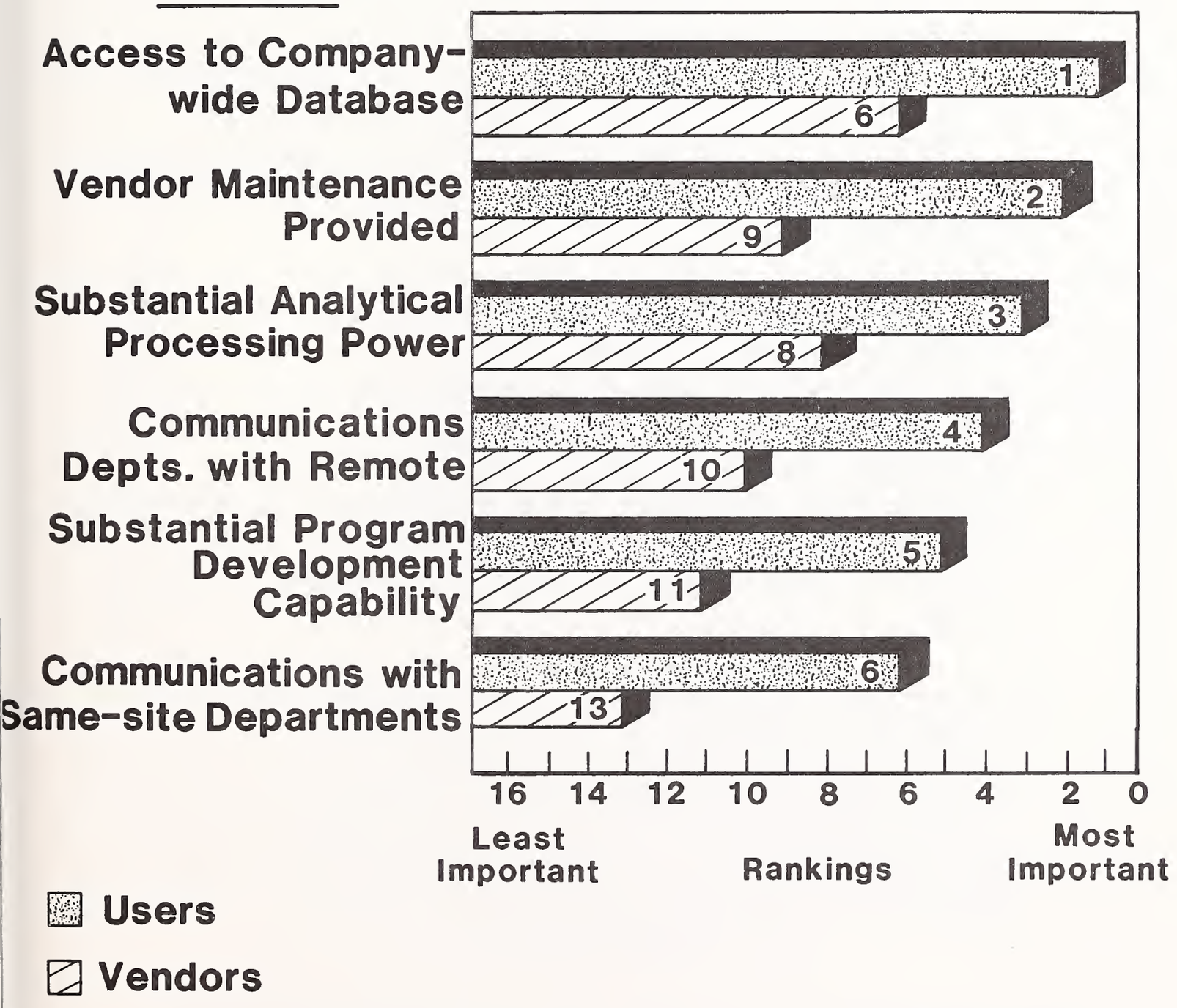
  - Communications with other departments on the same site was ranked sixth with users, but was thirteenth with vendors.

- Vendors tended to underrate, in comparison to users, the importance of the features shown on this exhibit.

- The difference in vendor and user perceptions illustrates the complexity of understanding and responding to the PC-RCS market. Vendors must be careful not to make assumptions about market needs; thorough research is mandatory.

EXHIBIT II-5

RCS VENDORS ARE MISPERCEIVING USERS' NEEDS



F. FULL-SERVICE OFFERINGS ARE BEST

- The PC assault on traditional RCS offerings, an irritant today, will become a major attack during the next few years. When INPUT compared 26 hardware, software, cost, and other factors that PCs and RCS have in common, RCS dropped in superiority from 20 out of 26 today to 13 by 1985. By 1988 the RCS advantage declines to only two of the 26 factors, with 11 factors being equal to PCs. The two enduring unique RCS capabilities deal with customer and application support. (Appendix C provides detail on this analysis).

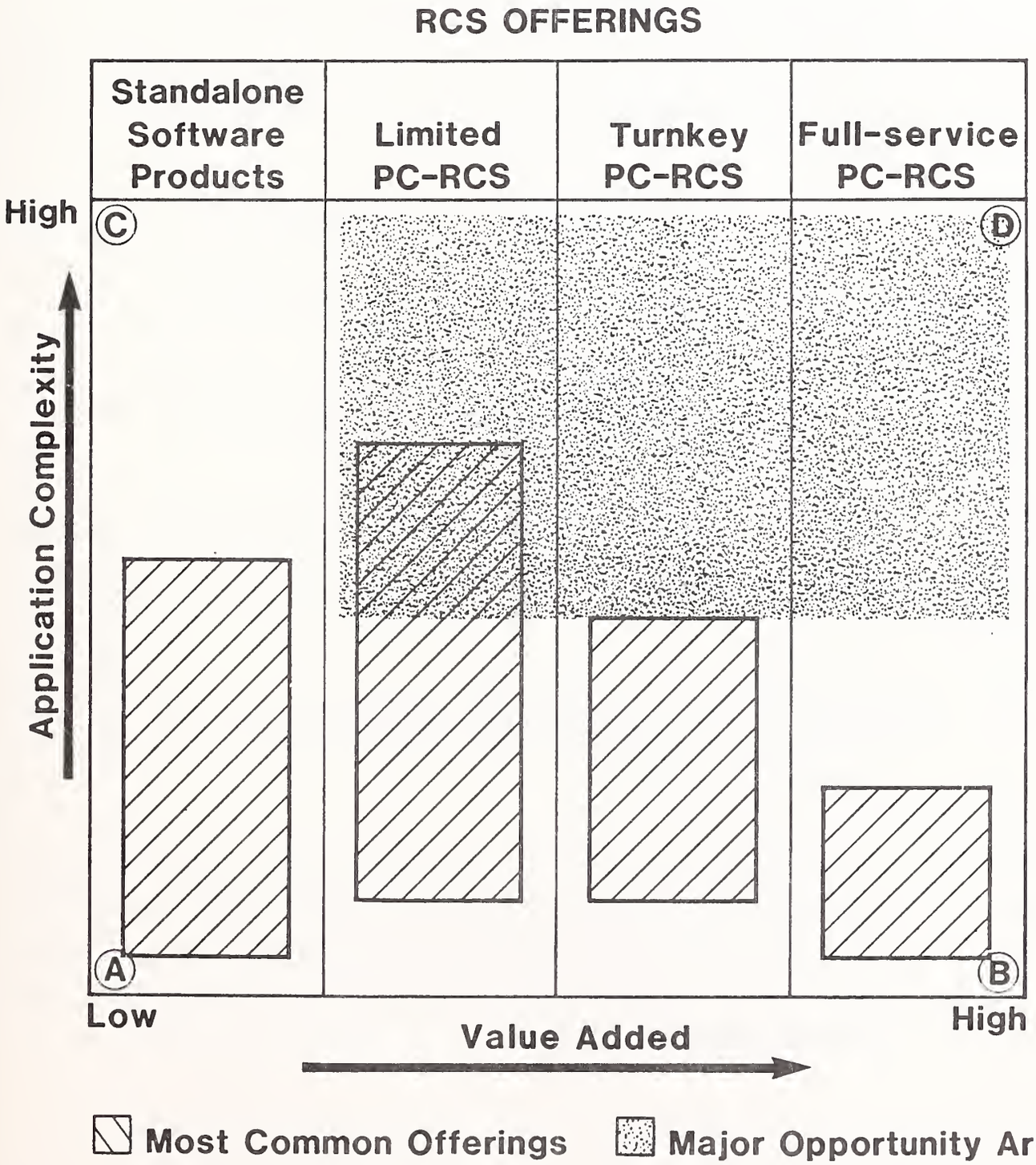
- Because of the dramatic appeal of PC solutions to end users, purely defensive measures by RCS vendors (repricing of existing RCS services, addition of new, non-PC-related features, etc.) will not be ultimately effective in stemming the PC tide.

- RCS vendors wishing to meet the PC challenge head-on must carefully consider the full range of options for developing a PC-RCS offering. As shown in Exhibit II-6, there exists a broad range of opportunities. Four types of RCS vendor offerings are shown: "Standalone Software Products" (offer no link to RCS processing), "Limited PC-RCS" (offers software and communications but no hardware; support is mostly remote), "Turnkey PC-RCS" (provides both hardware and software and usually local support), "Full-service PC-RCS" (offers all turnkey services, local and remote communications, and consulting).

- The strongest competitive posture for RCS vendors lies at the upper right-hand corner (quadrant D) of the exhibit. Most RCS vendor offerings to date have a relatively low competitive edge for the long term (i.e., quadrants A and B). RCS vendors must be careful not to squander scarce resources on low competitive-edge services (quadrant A). Significant opportunities await vendors who can aggressively enter the quadrant D position.

FULL-SERVICE OFFERINGS ARE BEST

- RCS Superiority Dropping from 20 to 2 Factors
- Defensive Strategies Are Inadequate



G. UTILISE RCS STRENGTHS LESS VULNERABLE TO PCs

- Many of the traditional strengths RCS vendors have touted in comparison to in-house solutions (e.g., lower cost, more control, and independence) are now being usurped by PCs. Thus it is critical that RCS vendors select PC-RCS offerings that leverage strengths unlikely to be duplicated by PC technology. Several of these RCS strengths follow.

  - A strong customer and application knowledge base is invaluable. This is best acquired by focusing resources on a small number of market segments.

  - Users have significant communications needs that RCS vendors can readily address. These include value-added as well as local-area networks.

  - Large, centralised processors can provide data base as well as transaction-oriented capabilities complete with backup.

  - RCS vendors can offer a fuller range of customer support to include installation, training, and business consulting as well as expendables such as media and supplies.

  - Because of their local offices for sales and support, RCS vendors can be responsive to customer needs. This asset is hard to duplicate and should be fully exploited.

  - In addition, users benefit from the accountability of an RCS vendor who takes responsibility for a complete range of service components. Such an approach enables RCS vendors to help corporations solve major problems requiring the blending of different hardware, software, and communications systems.

EXHIBIT II-7

UTILISE RCS STRENGTHS LESS VULNERABLE TO PCs

- Customer/Application Knowledge
- Networks/Communications
- Proprietary Databases
- Large Processing Capacity Backup
- Full Customer Support
- Local Responsiveness
- Accountability
- Customised Blending of Services

H. PC-RCS CHARACTERISTICS TO EVOLVE

- Although most surveyed vendors currently provide offerings that lack competitive distinction for the long run, many of them plan to remedy this weakness during the next three years.

- Future PC-RCS characteristics will evolve to emphasise industry-specific applications. This will enable RCS vendors to better leverage their customer/application knowledge base.

- PC-RCS applications will evolve from a single offering to multiple systems carefully integrated to enhance ease of use and processing economies.

- Whereas most PC-RCS offerings now focus on analytical applications, future services will also offer both in order to facilitate application integration.

EXHIBIT II-8

PC-RCS CHARACTERISTICS TO EVOLVE

PC-RCS Characteristics	Now	In Three Years
Market Focus	Cross-Industry	➧ Industry-Specific
Application Focus	Single e.g., Financial Planning	➧ Multiple Linked
Processing Focus	Mostly Analytical	➧ Balanced (Analytical and Transaction)

(Continued)

H. PC-RCS CHARACTERISTICS TO EVOLVE (continued)

- Surveyed vendors indicated a distinct evolution towards more precisely focused offerings. These future services may include hardware, hardware maintenance, and software downloading less frequently, though communications at the user's site will be more prevalent. Thus improving profit elements of value-added services is already a part of many vendors' plans.

- RCS vendors also recognise that distribution channels must be greatly expanded to include such options as joint ventures with OEMs and manufacturers, as well as use of wholesalers and retailers, etc. Use of multiple distribution channels enables RCS vendors to more quickly and economically develop and market services to reach the multitudes of potential customers.

PC-RCS CHARACTERISTICS TO EVOLVE

PC-RCS Characteristics	Now		In Three Years
Hardware Included	90%	➧	85%
Hardware Maintenance	60%	➧	55%
Software Downloading	30%	➧	50%
User Site Communications	10%	➧	30%
Distribution Channels	Single (Sales Force)	➧	Multiple

I. PC-RCS STRATEGY RECOMMENDATIONS

- Develop a positive PC-RCS strategy. The objective should be Quadrant D strategies that provide long-term competitive strength.

- Several suggestions are provided here for maximizing opportunities.

  - Vendors should search for their unique strengths vis-a-vis PCs. (A competitive assessment form in the companion U.S. report, Personal Computer Opportunities for Remote Computing Services Vendors (June 1983), referenced in Appendix F is designed to help RCS vendors pinpoint their strengths and vulnerabilities application by application.)

  - Vendors should target markets in which they have expertise. It is hard enough to adapt to new PC technology and distribution channels without the burden of learning a new market.

  - Recognize the users' needs for access to their company data bases. Seek to meet users' needs for communication among departments.

  - Gain support of in-house data processing personnel by offering assistance to the in-house information center.

  - Take maximum advantage of local RCS sales hardware and software maintenance services. Emphasize your established name and reputation.

  - Buy or otherwise acquire needed software. Opportunities will be lost if in-house software development slows down entry into this rapidly changing market.

PC-RCS STRATEGY RECOMMENDATIONS

- Find Best Opportunities via a Customised Self-analysis
- Focus on Familiar Markets
- Give Users Access to Company Databases
- Help Users Communicate Better
- Work through In-house Information Center
- Leverage Local Sales, Support
- Buy or Commission; Don't Build

J. MOVE POSITIVELY INTO PC-RCS

- PCs are a revolutionary, long-term phenomenon that will continue to grow significantly in both capability and acceptance. Because of this rapid acceptance, defensive strategies that rely on repricing and repackaging of existing services rather than incorporating PCs into the RCS offering are obsolete.

- Identifying appropriate PC responses is a major, ongoing task. Careful, systematic analysis of unique strengths and vulnerabilities is an essential activity for the RCS vendor desiring a share of the exploding PC-RCS market.

- Restricting PC-RCS offerings to known markets is an important factor due to the complexity of adapting to new PC technology and distribution channels.

- Developing full-service strategies is vital to long-term success. Include access to data bases, both external and internal, via communications. Emphasize support services such as hardware and software maintenance as well as training and consulting.

- Use new distribution channels to exploit scarce resources in order to reach the widespread, fast-changing market. Seek out joint ventures, dealer and/or OEM opportunities.

- In all aspects of PC-RCS strategy development, it is important to move rapidly. A $1.8 billion market will be available, but only to those who seize the opportunity without delay.

EXHIBIT II-10

Summary

MOVE POSITIVELY INTO PC-RCS

- Rapid PC Acceptance Is Making Defensive RCS Strategies Obsolete
- Assess Unique Strengths and Vulnerabilities
- Stay within Known Markets
- Evolve to Full-service Offerings
- Leverage Database, Communications, and Local Support
- Explore New Distribution Opportunities
- Time Is of the Essence

III MARKET ANALYSIS

III MARKET ANALYSIS

- This chapter presents INPUT's forecasts for PC-RCS user expenditures for the five-year forward period 1983 to 1988. The forecasts are made at constant 1983 dollar rates and include national expenditure forecast revenues converted to U.S. dollars at the exchange rates given in Appendix G.

A. MARKET FORECASTS

- INPUT's forecast for total RCS user expenditures in Western Europe for the years 1983 to 1988 is compared with an equivalent forecast for total personal computer (as defined in Appendix A) hardware and software expenditures for the same period, as shown in Exhibit III-1. The PC market started from a very small base in 1979 but is now comparable in size in 1983 (68% of the RCS market) and is due to overtake RCS by 1988 when it will be 138% of the then RCS market.

- The market potential within RCS for the provision of PC-related services is shown in Exhibit III-2. This is a significant market segment with an added-value component of $1.3 billion by 1988.

  - RCS revenue from PC-based services will grow from $80 million in 1983 to $1.8 billion in 1988, with an average annual growth rate of 86%.

EXHIBIT III-1

MARKET FORECAST COMPARISON: PC VERSUS RCS
WESTERN EUROPE
(1983-1988)

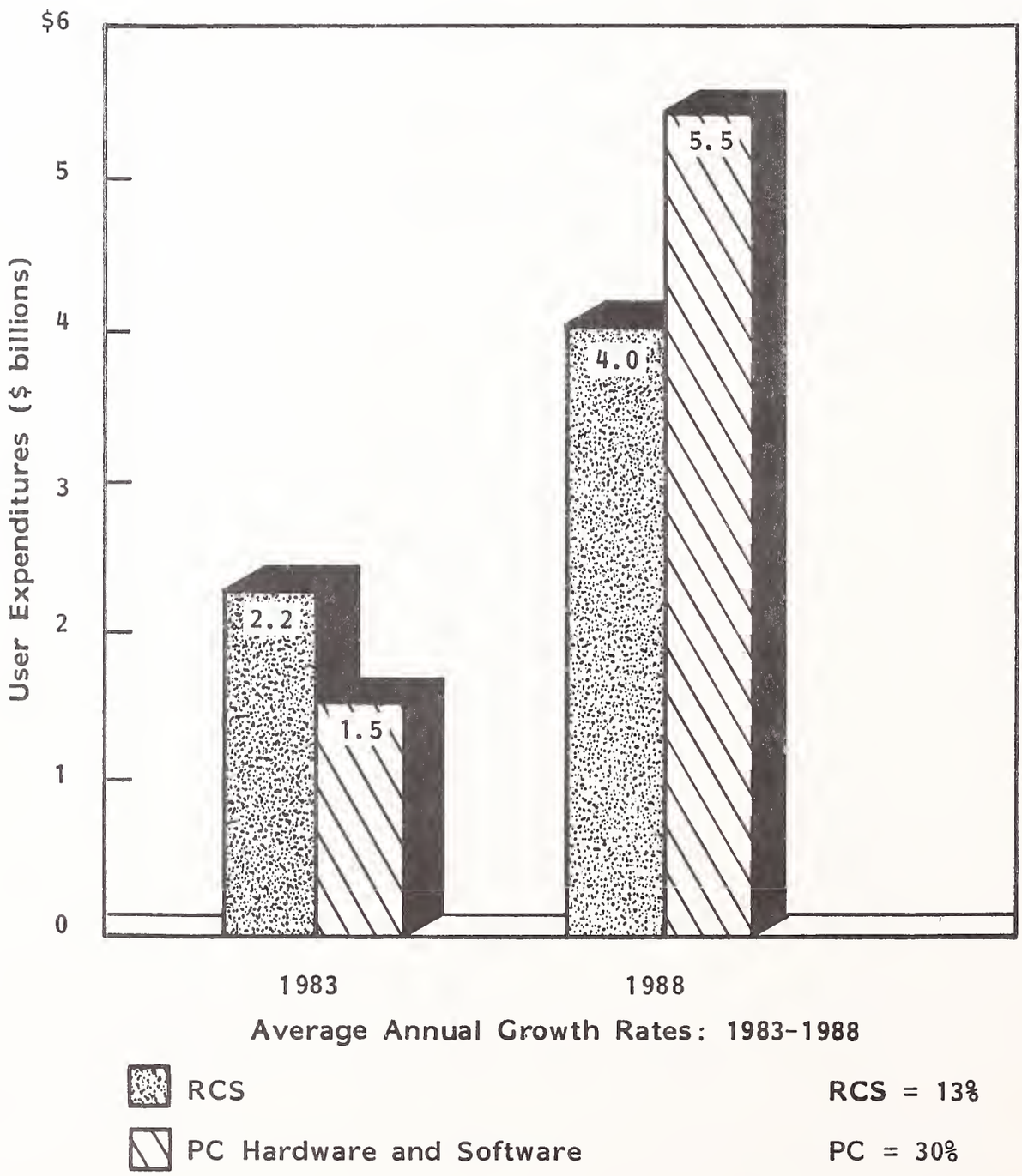
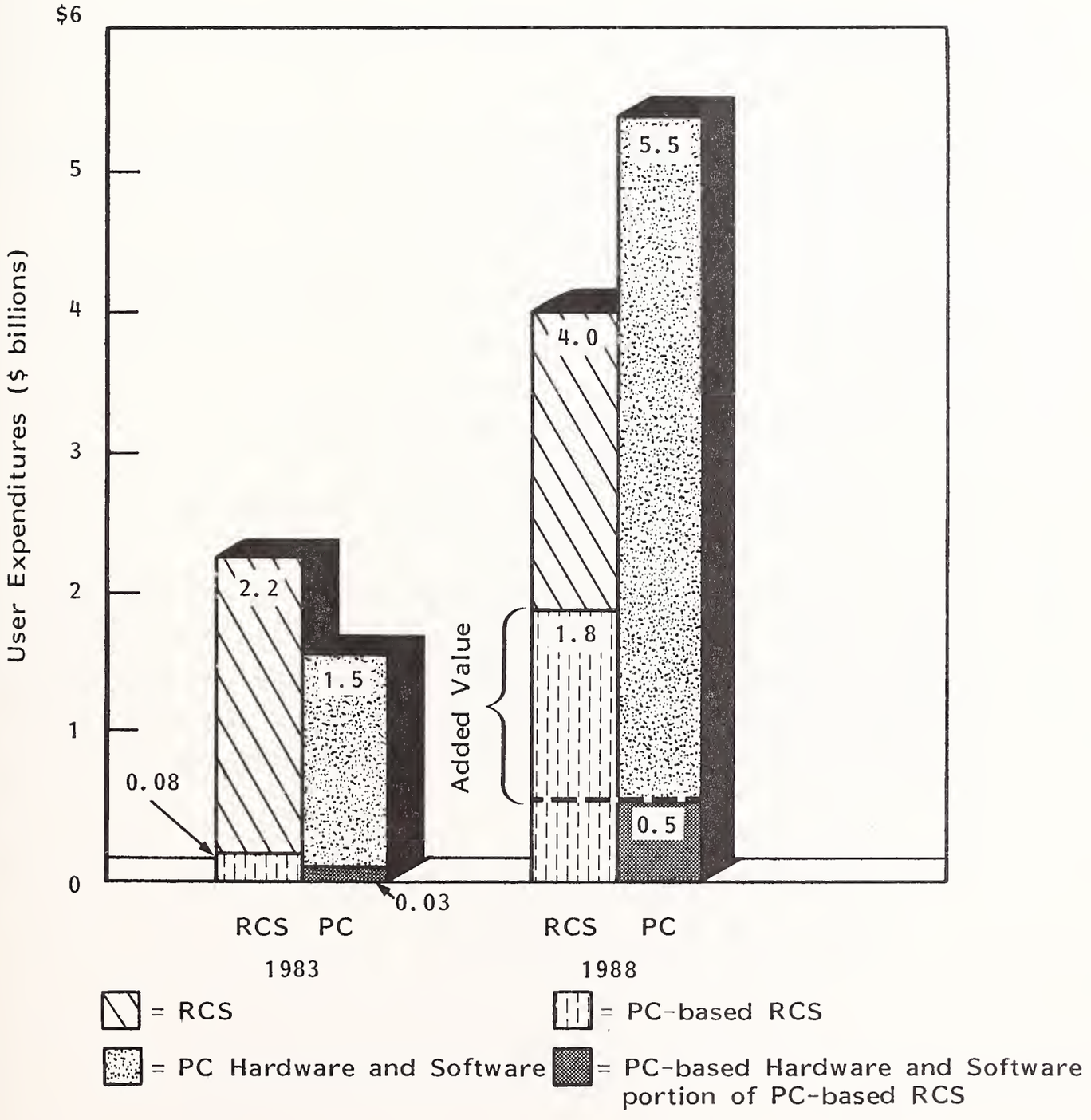


EXHIBIT III-2

PC-BASED RCS MARKET FORECAST
WESTERN EUROPE
(1983 - 1988)



- The proportion of RCS revenues derived from these PC-based services will increase from 4% in 1983 to 45% in 1988.

- The portion of the PC hardware and software market related to PC-RCS will also grow from $30 million in 1983 (2% of all PC hardware and software) to $0.5 billion by 1988 (9% of all PC).

B. GAINS AND LOSSES

- INPUT estimates that there will be a 22% loss in total West European RCS expenditures in 1983 due to installation of PCs.

- The majority of these losses will be in cross-industry general business services:

  - Small business accounting, payroll, and invoicing.

  - Financial planning for small-scale problems and projects.

- Some gains began to be apparent in 1983, particularly in France and the U.K. where commercial data processing systems based on reputable brands of PC hardware are beginning to make inroads in their own right. These services are principally cross-industry, general business-type services, but there are minor components of the total of $80 million spent in 1983 attributable to:

  - Utility services.

  - Industry-specific business systems.

- The real future loss to RCS vendors from PCs lies in the PC's ability to erode RCS growth potential. New utility applications, mainly associated with networking, will go to in-house PC development, often, in the case of larger companies, orchestrated by the EDP department wielding some form of local area network (LAN), unless RCS vendors become less parochial in their marketing approach.

IV USER ANALYSIS

IV USER ANALYSIS

- This chapter describes, for each country researched, the characteristics of PC and RCS use in the companies interviewed, and relates these characteristics to the difficulty of mounting PC-RCS services in each. (1982 year-end exchange rates are listed in Appendix G.)

A. FRANCE

- The sample of companies interviewed consisted of 20 of France's largest groups and another five medium-sized firms. Their total revenues in 1982 amounted to over 246 billion French francs, and they employed over 330,000 staff. This group thus represents a 7% sample in terms of national GDP (gross domestic product) and a 1.5% sample in terms of the working population.

1. GROWTH OF PCs

- The corporate use of personal computers has been slower to pick up than in the Anglo-Saxon countries, but it is nevertheless now strong and is expected to go on rising in the next five years.

- The respondents interviewed had responsibility for an installed base of 224 units in 1982 against a present (1983) base of 846 - an increase of 278% in the 12 months.

- All save two respondents (both non-PC users) reported increases in use, and 15% reported their first installations were made in the last year.

- The average number of units per department is still below two.

- The three most frequently mentioned application areas for PCs are all cross-industry in character, as shown in Exhibit IV-1. The first and third most important in the ranking by number of mentions are traditional RCS revenue earners:

  - Financial planning.

  - Scientific and technical calculations.

- Though PCs are patently at present only viable for small-scale problems in these areas, their continuing development in terms of hardware capability represents a long-term threat.

- Notable by their low ranking in application use are the traditional activities of payroll and accounting.

- The specific brands of PCs installed in the countries researched are analysed in Exhibit IV-2. The leading brand in France is still quoted as Apple, but the speed of growth of the IBM PC base in the last year indicates that it will shortly become the leader. Local suppliers are mentioned in approximately 12% of cases. Japanese brands have likewise not yet made large inroads into the business market for PCs.

- All except three companies (one of which was the only current non-PC user interviewed) expected an increase in purchase expenditures on PCs in the coming year. The average rate of growth anticipated is 68%, with a peak of 3,000% in one instance.

EXHIBIT IV-1

USE OF PC APPLICATIONS
FRANCE

APPLICATION AREA	MENTIONS 1ST	2ND	3RD & OVER	OVERALL RATING
Financial Planning, DSS*	3	4	1	1.8
Word & Text Processing	3	2	1	1.4
Scientific and Technical Calculations	3	1	2	1.3
Industry-specific	2	2	1	1.1
Management Reporting	3	1	-	1.0
Spreadsheet (VisiCalc, etc.)	2	1	1	0.9
Local Files Handling	1	2	4	0.8
Human Resources, Personnel	1	2	-	0.7
Payroll	1	1	-	0.5
Database Inquiries	1	-	-	0.3
Marketing/Sales	1	-	-	0.3
Other† or Not Specified	4	4	3	2.3

*Decision Support Systems
†Includes graphics and laboratory analyses, with multiple mentions.

EXHIBIT IV-2

RESPONDENTS'
1983 PC USE BY BRANDS AND COUNTRIES
WESTERN EUROPE

SUPPLIER COMPANY	BRAND MENTIONS				
	U.K.	FRANCE	WEST GERMANY	ITALY	TOTAL
ICL	2	-	-	-	2
Hewlett-Packard	2	3	2	-	7
Superbrain	2	-	-	-	2
Sirius	6	6	1	-	13
Tandy	-	1	-	-	1
Apple	10	12	3	-	25
IBM	8	8	3	-	19
Commodore	3	3	1	-	7
Digital	-	3	-	-	3
CII-HB/R2E	-	3	-	-	3
SKS	-	-	3	-	3
Other or not Specified	15	11	7	8	41
Total	48	50	20	8	126

- Interconnection of PCs is an important short-term requirement for the large business user. Whereas only 40% are connected today, in a year's time only 6% expect to have no linked PCs in their companies.

  - Host networks will retain their current lead as the most favoured interconnection mode. RCS, which currently holds second place with 40% of the connections mentioned, will have to be content to see LANs sharing this second place with them, each having 22% of the network installations.

  - The principal reason for networking PCs is to be able to share common data, as shown in the table below, but this is also reinforced by the desire to integrate data processing, which is showing itself particularly in the larger groups:

Reason for Interconnection	Percent of Respondents Quoting the Reason
. Sharing common data	68%
. Sharing common peripherals	40
. Electronic mail	36
. Other, including: central data base access, DP integration	36

2. IMPACT OF PCs ON RCS REVENUE

- Almost 50% of users reported an increase of RCS expenditure in the previous 12 months, whereas approximately 25% each reported stable or decreased expenditure. The overall percentage increase cited was 36%.

- This contrasted starkly with an overall average decrease in the coming 12 months anticipated at 15%. This figure was made up from 54% of relevant

respondents quoting a decrease in RCS use, while anticipations of a stable or an increasing expenditure were 15% and 31% respectively.

- Even allowing for users' noted reluctance to commit under interview to having external services expenditures, the disparity between this year's and next year's expected growth rates must be a source of concern to RCS vendors.

- Specific plans to move RCS expenditures in future were reported by 62% of the RCS users, whereas only 12% of respondents said they had already transferred RCS applications to PCs. These transferrals to other delivery modes were quoted in the following order of frequency:

  - Personal computers and micros.

  - In-house minicomputers suitable for timesharing.

  - In-house mainframes.

- However, the majority view among French users is that the equation is not as simple as straight replacement of RCS by PCs. Exhibit IV-3 lists some typical reactions encountered during the survey. They illustrate the current strong trend in France's large groups towards a strengthening of central control. This trend was mentioned specifically by RCS vendors.

- True PC-based RCS was only noted in one installation, though a second user had interfaced his Sirius PC to a NOMAD database held remotely.

EXHIBIT IV-3

USERS' COMMENTS ON THE TRANSFERAL OF
RCS APPLICATIONS IN-HOUSE - FRANCE

- "We would rather transfer our external services onto an in-house minicomputer, such as a VAX."
- "The installation of PCs, which is just starting here, also represents an opportunity for service vendors to furnish us with access to third-party databases, quite apart from their standard DP services."
- "In specific instances we would go in-house onto a PC, e.g., for DCF calculations using VisiCalc."
- "We bought a PC to run a previously manual system. RCS is separate and happens throughout the group."
- "We would come in-house for text composition and print-run preparation, but a micro couldn't handle that. It means a mini."
- "Our PCs and micros will be introduced for workshop and servicing applications that are at present manual applications operated by workshop clerical and supervisory staff."
- "No; the two types of service are thought of as distinct."
- "Historically it has been the DP centre's application backlog that has driven users to purchase a PC."
- "Moving off RCS would be a reason for augmenting our central configuration."

B. THE U.K.

- The sample of British companies interviewed consisted of:

  - Two small first-time computer users.

  - Six slightly larger companies, or divisions within large groups, who had acquired PCs for departmental purposes.

  - Seventeen medium to very large groups, whose uses of PCs ranged from financial to shop-floor operations.

- 1982 revenues of this sample set totalled 27.8 billion pounds sterling (or 9% of the national GDP), while the number of staff employed (271,000) was around 1.2% of the U.K. working population.

1. GROWTH OF PCs

- Though the U.K. is the country most densely populated (per capita) with microcomputers (there were an estimated 1,000,000 machines in the U.K.'s installed base), it is second only to West Germany in the European league for business microcomputer installations costing less than $15,000. INPUT estimates that over 100,000 business systems below this price ceiling will have been installed by the end of 1983.

- The respondents interviewed had been responsible for installing or supervising and advising on the installation of 732 system units by the interview date. This showed an increase of 160% over the figure of 282 installed at the same point in the previous year (1982).

- Another 71 machines were known to be installed in the groups sampled, though not coming within the direct control of the respondents. This total of 803

units is installed in different types of departments according to the breakdown shown in Exhibit IV-4.

- The three most important types of user departments are oriented away from management and administrative functions and towards operational and production activities.

- In the more than 70 departments where specific numbers of installed units were quoted, the average number of machines per department was 1.5.

- Except for one respondent, who reported a stable situation with two installed PCs, all U.K. interviews evidenced an increase in installed units over the same time last year.

- The most favoured applications are listed in order in Exhibit IV-5. In the top three mentioned, only financial planning is a key RCS application. General accounting is the only traditional DP application at all frequently mounted on PCs.

- The brands of PC most frequently selected in the U.K. are shown in Exhibit IV-2, already mentioned.

  - Apple's lead over the IBM PC is less clear than it is in France.

  - There is a greater number of other brands cited, evidence of the many indigenous start-up companies that have entered the U.K. market in the last three years.

- Only 16% of respondents expected expenditures on PCs to decline or remain stable over the next 12 months. Among the 76% who anticipated growth in expenditure, the average of the increases quoted was 193% (two responses, 8%, were not known).

EXHIBIT IV-4

1983 INSTALLED BASE BY TYPE OF END-USER DEPARTMENT
U.K.

END-USER DEPARTMENTS INSTALLING PCs	CURRENT INSTALLED BASE	
	NUMBERS MENTIONED	PERCENT
Industry-specific	285	35.5%
Operations	175	21.8
Research/Engineering	96	12.0
Planning/Administration	53	6.6
Marketing/Sales	51	6.4
Accounts/Finance	46	5.7
Information Systems	12	1.5
Other/Not Specified	85	10.6
Total	803	100.0%

EXHIBIT IV-5

USE OF PC APPLICATIONS
U.K.

APPLICATION AREA	MENTIONS			OVERALL RATING
	1ST	2ND	3RD & OVER	
Spreadsheet (VisiCalc, etc.)	7	5	-	3.1
Industry-specific	5	4	2	2.5
Financial Planning/DSS	4	3	4	2.2
Word & Text Processing	4	4	2	2.2
General Accounting	3	4	1	1.8
Order Processing/Stock Control	1	2	-	0.7
Marketing/Sales	1	-	2	0.5
Management Reports	-	2	-	0.4
Payroll	-	-	3	0.3
Local File Handling	-	-	3	0.3
Other* or Not Specified	2	1	1	0.9

*Includes: Graphics and Project Management.

- Reasons given for not increasing expenditures were:

  - "Applications have been developed."
  - "The next stage will require a minicomputer."
  - "PCs will become terminals to a DEC VAX."

- Networking of installed PCs is already taking place with 56% of users.

- By mid-1984, 84% of PC users will be networking them.

- Connection by a host mainframe or minicomputer is twice as common as by some form of LAN and three times as common as the use of an RCS network. This preference rating is not predicted to change according to users' plans for the coming year; though LANs will increase in popularity vis-a-vis host connections, RCS will remain in third place. This clear waste of RCS networking expertise and capacity could be altered by aggressive marketing on the vendors' part.

- The main reason given by the U.K. users for wanting to link their PCs is to share data. The table below gives the percentage of respondents who mentioned each reason advanced in the questionnaire:

Reason for Interconnection	Percent of Respondents Quoting the Reason
. Sharing common data	84%
. Sharing common peripherals	52
. Electronic mail	48
. Other, including: FAX, Telex and Teletex capabilities	—

2. IMPACT OF PCs ON RCS REVENUE

- Respondents' spending patterns on RCS are erratic. Whereas last year 38% of the users reported an increased expenditure and 46% reported no change, for the coming year 62% anticipate an increase and 38% a decrease. For the subsample of RCS users interviewed, the decline in expenditure registered between 1982 and 1983 was -13%. In 1983 to 1984 it is forecast to be -30%.

- Only 30% of respondent users cited PCs as a prime reason for replacement of RCS, and in three out of these four cases the replacement motivation was to integrate DP internally. In the other case the reason was to reduce RCS costs.

- A variety of philosophies were expressed on the interrelationship of RCS and PCs within an organisation's information supply. Exhibit IV-6 contains a selection of the most common sentiments. The most noticeable thread in U.K. users' thinking is that they have sufficient experience now, in the larger companies particularly, to be able to select the correct level of product and service for each task as it arises.

C. WEST GERMANY

- Because of the historically high communications costs in the Federal Republic (for both data transmission and the modem devices themselves), RCS has been contributing a relatively small portion of West German processing services revenue. This makes it hard to identify end users with both PC and RCS expenditures. For this reason the sample of completed questionnaires that went forward for analysis amounted to only 13:

  - Three small, three medium, and seven larger companies.

EXHIBIT IV-6

USERS' COMMENTS ON THE TRANSFERAL OF RCS APPLICATIONS IN-HOUSE - U.K.

- "PCs do not take on RCS tasks - there is a well-established split - we will have some mainframe systems, however, that transfer to PCs."
- "Timesharing is on an internal bureau system. PCs are not expected to erode its workload."
- "We install PCs in regional offices to which the mainframe doesn't have access."
- "I can't think of a single case where a PC was brought in to replace an RCS service."
- "We originally started installing PCs as a matter of central policy to bring computing closer to the users; now they are asking us for them!"
- "We don't use outside service suppliers as providers of straight computing; they are specialist suppliers used for particular services. Therefore they don't come into contention with PCs, which provide general computing."
- "Outside timesharing tends to be replaced by in-house minis and superminis."
- "PCs are implementing tasks that were previously clerical."
- "PCs are being bought to reduce external timesharing costs."

- In addition, five extra vendors were interviewed as spokesmen for their clients. Their views have been considered though not formally analysed, except in certain specific tables (e.g., the analysis of brands installed).

- The total quoted revenues earned by the analysis sample in 1982 amounted to DM 5,672 million, or 0.4% of GDP. Staff employed numbered 25,000, i.e., 0.1% of the West German working population.

I. GROWTH OF PCs

- At the end of 1982 West Germany is estimated to have had an installed base of business PCs and microcomputers of over 80,000 units. This places it as the leading country in the business machine sector (i.e., units costing less than $15,000) for personal computers, though the U.K. with its high volume sales of home computers (in the less than $500 class) leads the consumer sector with about a million units installed.

- INPUT estimates that the West German installed base will have grown by the end of 1983 to 120,000 units for business use. The majority of these will have been sold to small businesses for standalone applications.

- The respondent sample had installed 40 PCs a year ago as compared to 86 at the time of the survey, an annual growth of 115%. All, except one user, have grown their installed bases, and the average ratio of machines to departments is approaching two.

- As shown in Exhibit IV-7, besides accounting, the most favoured application areas are industry-specific and word processing. Other lesser rates areas are a mixture of the traditional commercial and scientific bureau applications. In other words, PCs are most often used for small-scale and new applications rather than to erode those applications already implemented on a central system.

EXHIBIT IV-7

USE OF PC APPLICATIONS
WEST GERMANY

APPLICATION AREA	MENTIONS			OVERALL RATING
	1ST	2ND	3RD & OVER	
Accounting	3	1	2	1.3
Word and Text Processing	3	-	2	1.1
Industry-specific	2	1	-	0.8
Spreadsheet (VisiCalc, etc.)	2	1	-	0.8
Scientific & Technical Calculations	2	1	-	0.8
Order Processing/Stock Control	2	1	-	0.8
Payroll	1	2	-	0.7
Financial Planning	-	2	1	0.5
Management Reports	-	2	1	0.5
Production Systems	1	1	-	0.5
Local File Management	-	1	2	0.4
Marketing/Sales	-	1	2	0.4
Other	-	2	-	0.4

- The brands most often selected are shown, with their market shares among the respondents, in Exhibit IV-8. This exhibit gives the position a year ago (1982) and at the date of the survey (mid-1983).

- Though Apple still retains its 1982 leadership position, both it and Commodore lost market share in 1983 to IBM and to a host of new names including some from Japan. HP is another major supplier whose traditional marketing stance is having to change as new suppliers provide calculation and graphics capabilities, for which at one time it was the only competitive supplier.

- No respondent expected a decrease in expenditure on PCs, though two of the smaller companies saw themselves in a stable nil-growth situation. The average of the growth rates quoted was a high 140% over the coming year. The only nonuser of PCs is still evaluating his position and could also be a new entrant to the market.

- Interconnection of PCs is already a fact in 38% of cases, and this percentage will climb to 77% within the next year.

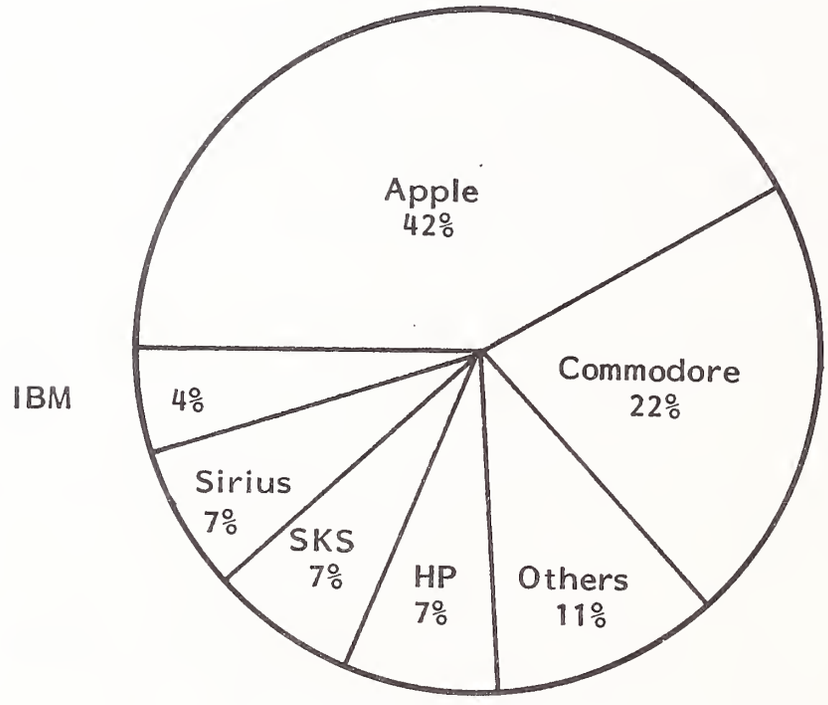
  - Host system linking is today the most common method and is used by all the networking respondents, but its share will fall to use by only 50% of them a year hence.

  - LANs and RCS will then be used by 50% and 40% of them respectively.

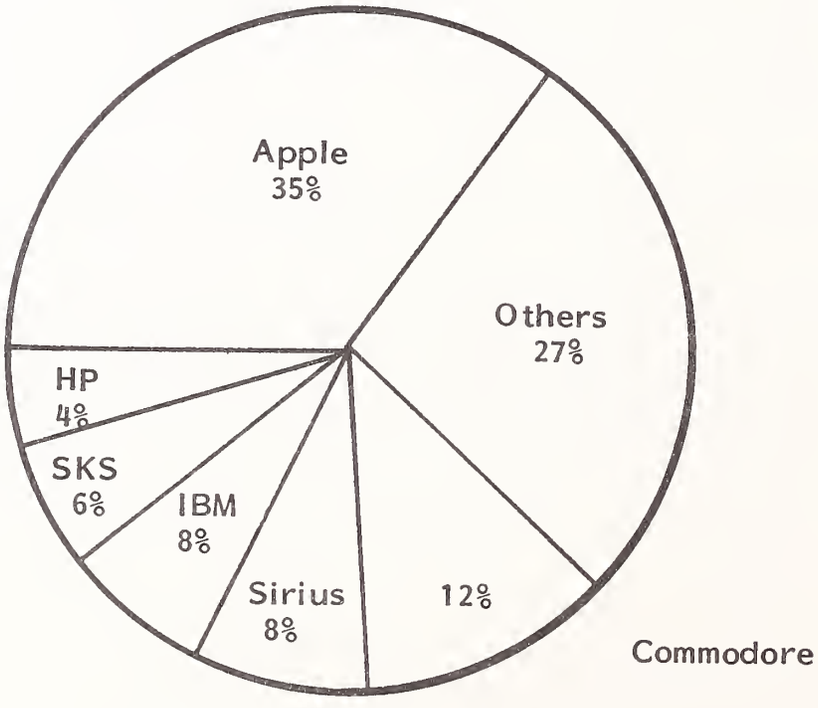
  - Sharing common data is once again the most common reason for interconnecting PCs, being quoted in all current linked installations. Sharing peripherals was next in importance.

EXHIBIT IV-8

PC MARKET SHARES OF RESPONDENT SAMPLE - WEST GERMANY



1982



1983

2. IMPACT OF PCs ON RCS REVENUE

- West German expenditure on RCS was reported to have experienced an average growth rate of 9% between 1981 and 1982. Fifty percent of users reported it as constant, while 37% experienced increased expenditure, and 12% decreased expenditure.

- This expenditure pattern is forecast to remain similar between 1982 and 1983, though individual respondents expected to change their spending on this service mode.

- Three respondents reported use of PC-RCS services, two with IBM data centres and one with Rhein Main RZ.

- Twenty-five percent of RCS users cited the advent of PCs as a reason for replacing or reducing RCS. The one user who stated that RCS replacement had been the basic objective of their PC installation, nevertheless reported nil change in RCS expenditure.

- Clearly from the analysis of applications replaced, there came the message that PCs were introduced to run new applications and any reduction of RCS was incidental.

- The impact of PCs on West German batch services is much more marked. Batch services are still accounting for some two-thirds of the country's processing services revenues. Most batch users are small firms who use their local service company for standard commercial applications. Many of these users have migrated to in-house PCs. Those who remain are finding their loyalty stretched.

- Off-line data entry on diskette is a common input mode for small West German users. They are presently impeded in the use of PCs for data entry by the lack of floppy disk recording standards. The RCS and batch bureaux are

therefore concentrating PC-RCS products around the well-established brand names for reasons of compatibility of input/output.

- Replacement of in-house terminals by PCs is not yet happening to any great extent. This will become a more important reason in the 1983-1984 time-scale. Evaluation of PC networking capabilities is underway in most larger German firms.

D. ITALY

- The sample of Italian user companies interviewed included 17 small companies and one medium-sized concern.

- The user analysis makes use of the ANASIN survey results for 1982. ANASIN is the Italian national trade association for computing service companies. A survey on microcomputer penetration in Italy was commissioned in autumn 1982 from INPUT's affiliate PGP Sistema of Milan.

1. GROWTH OF PCs

- The Italian microcomputer market reached the following size in 1982:

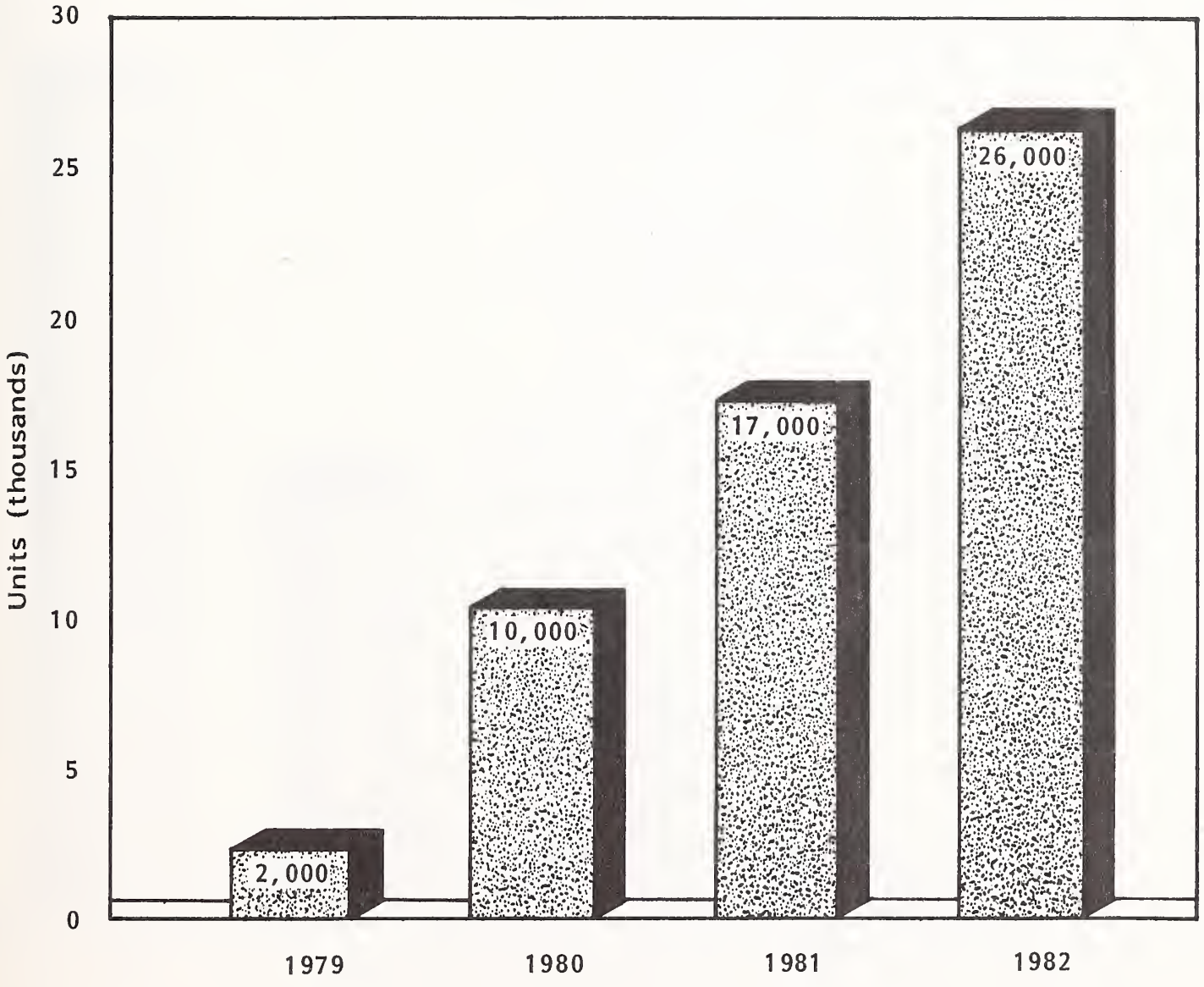
  - Twenty-six thousand units installed during the year (against 17,000 in 1981), as shown in Exhibit IV-9.

  - An installed base of 55,000, whose growth is illustrated in Exhibit IV-10. The size of the market by value in 1982 was greater than 100 billion lire.

- 1982 represented a year of transition with radical changes in the companies and models of computers offered, together with modification to the market position and features of each.

EXHIBIT IV-9

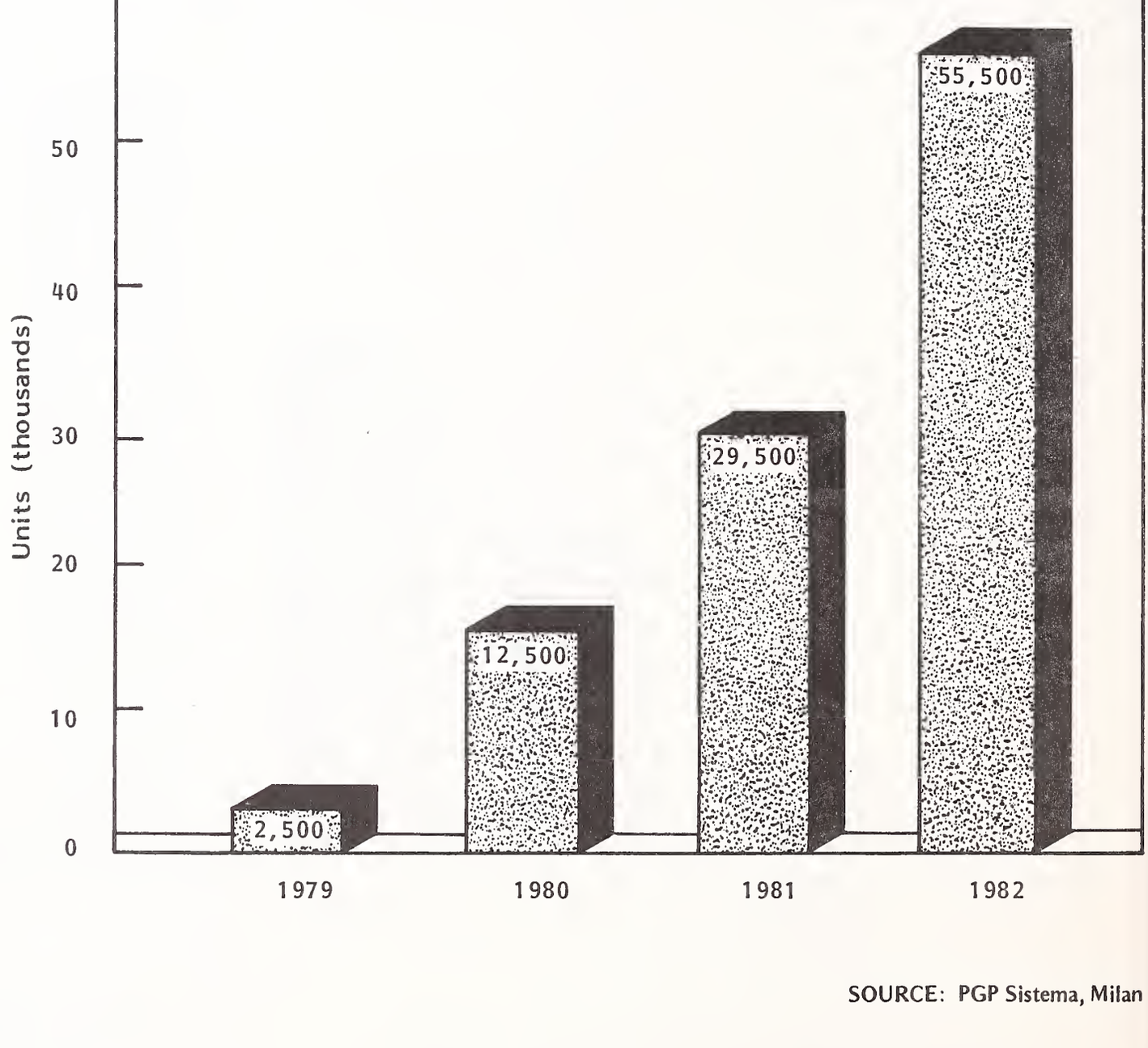
PC SHIPMENTS (1979-1982)
ITALY



SOURCE: PGP Sistema, Milan

EXHIBIT IV-10

PC INSTALLED BASE (1979-1982)
ITALY



SOURCE: PGP Sistema, Milan

- Whereas 1981 was characterised by market consolidation on the part of the traditional microcomputer manufacturers (Apple, Commodore), 1982 was the year when the major manufacturers (Digital, Xerox, Olivetti) entered the market. But it is during 1983 that the full force of this movement is being felt, when they have also been joined by IBM.

- In this respect the first growth figure (53%) is relatively significant because it was achieved due to a substantial broadening of the offering, which has thus revolutionised the scope and market share of the sector.

- The role of Olivetti has been predominant. This company took the leadership position with 35% followed by Apple with 15% (against its 26% achieved the previous year).

- This figure, which is based upon Olivetti's commercial strength and their extremely aggressive sales strategy, is principally, however, a figure derived from "trade-in" deals. INPUT is waiting for this to be confirmed when the market replies to these moves in 1983, when the really big battle for market share will be engaged.

- The main factors that have conditioned the market can be summarised in the following points:

  - Technologically more advanced hardware offerings: 16-bit microprocessor, 128K central memory expansion, marketing of mass memory; development of networking. (Such hardware developments have not, however, been paralleled by equivalent progress in software, in terms of operating systems and utilities).

  - Entry of the major manufacturers (i.e., Olivetti, DEC, Xerox) and their impact on the market.

- The trend to direct selling on the part of the traditional sector leaders.

- Introduction of new models by the main distributors (i.e., Sirius, Osborne, Corvus, ITT, etc.).

- The increasing numbers of dealers and their increased market penetration.

- A notable slowing down in the growth of demand.

- On the other hand, the influence of the general economic situation has also been felt because of the decrease in investment and, although to a lesser extent, because of:

  - A general tendency on the part of users to wait for developments in what is after all a fairly volatile market.

  - A certain disenchantment born of past errors.

- The principal use of microcomputers is tied to management (or professional) applications. Exhibit IV-11 gives the application breakdown by major categories of use.

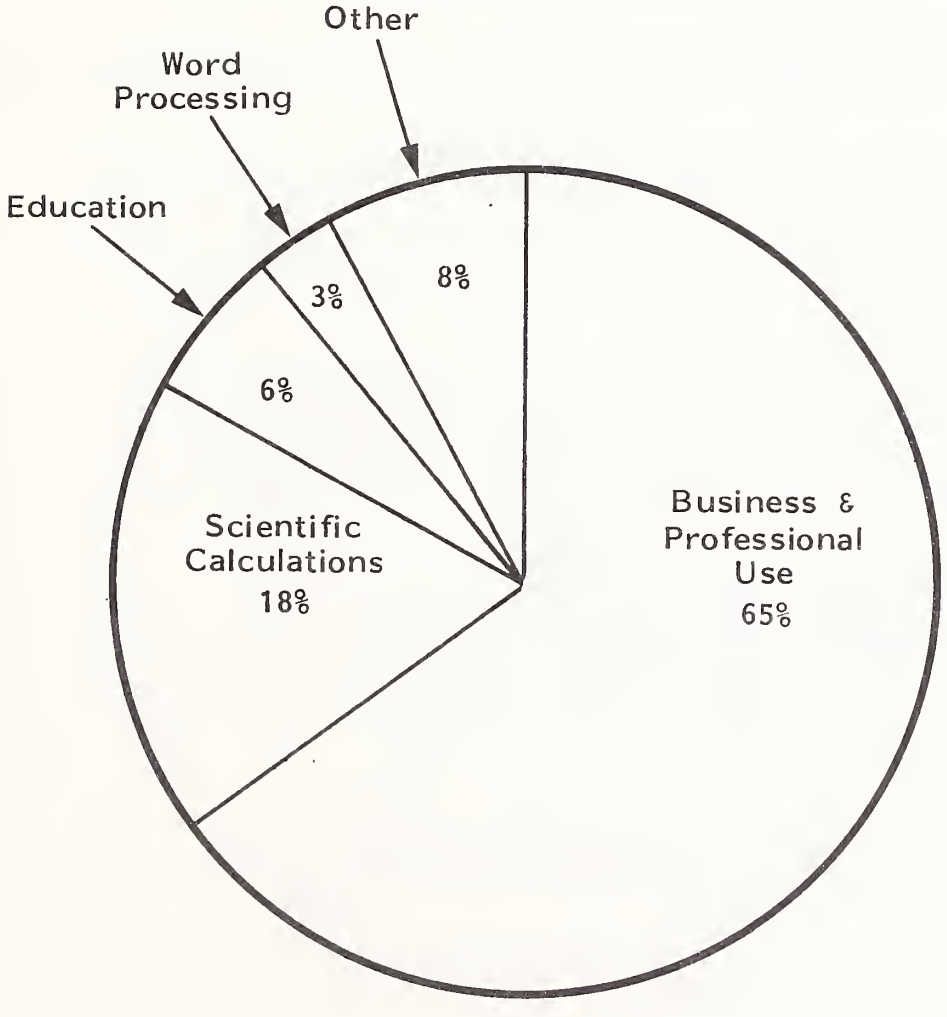
- During 1983 this feature is expected to continue.

- Sectors showing a greater than average growth are word processing and education.

- Users are predominantly found among small- and medium-sized businesses, the professions, and commerce. Exhibit IV-12 shows the breakdown of the current installed base by type of organisation.

EXHIBIT IV-11

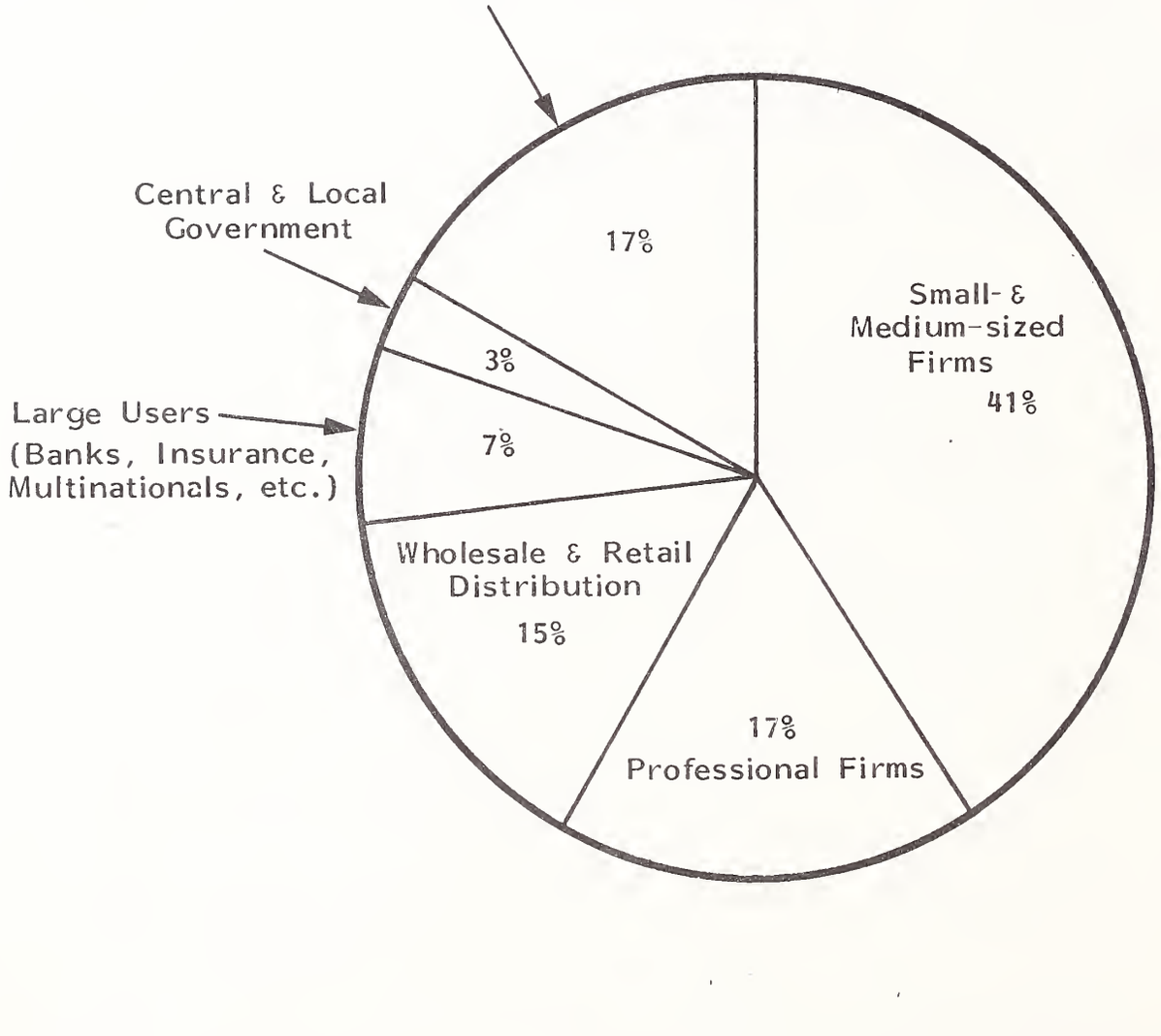
PC APPLICATION AREAS, 1982
ITALY



SOURCE: PGP Sistema, Milan

EXHIBIT IV-12

COMPANY SIZE AND PC INSTALLED BASE BY INDUSTRY
ITALY



SOURCE: PGP Sistema, Milan

- The concepts of using the PC as a terminal in a network or for office automation have only to a cetain extent penetrated the budget thinking of DP management.

- At the present time, Italy is going through an experimental phase (in particular, with network protocols for central host systems and terminal emulation) that seems to be affecting all the major suppliers.

- Illustrations of these trends were furnished by the interview analysis:

  - Only one user had increased his installed base of PCs in the last 12 months, taking the sample's base from 123 units in 1982 to 133 in mid-1983, a growth of 8%.

  - Growth in PC expenditure is expected to be 12% for established users with 50% going for increased spending and 25% each for constant or declining expenditure.

  - Evidence that users have reached a capacity ceiling in their use of PCs was afforded by the 25% of current users who wish to move their applications to a minicomputer or to a mainframe within the next year.

  - Users have only attempted basic commercial types of applications, as illustrated in Exhibit IV-13 by the limited range cited.

  - None of the Italian PC users have connected them to a network, illustrating the greater number of standalone small business uses for which the country offers great potential.

2. IMPACT OF PCs ON RCS REVENUE

- RCS revenues are expected to continue rising. From a 12% growth rate attributable to 1982, the figure will have fallen to 11% in 1983. This registers

EXHIBIT IV-13

USE OF PC APPLICATIONS
ITALY

APPLICATION AREA	MENTIONS			OVERALL RATING
	1ST	2ND	3RD & OVER	
Accounting	4	4	-	2.0
Marketing/Sales	1	-	1	0.4
Order Processing/Stock Control	1	-	-	0.3
Management Reports	1	-	-	0.3
Other	1	-	-	0.3

in the users' interviews by an increasing number of firms anticipating higher expenditures this year, and no users looking to spend less, but overall turnover growth being reduced.

- There was no instance in Italy of any use of a combined PC-RCS service.

- In-house networks are being implemented using standard dumb or smart terminals. Intelligent and micro-based terminals are a small minority.

- Exhibit IV-14 lists some of the comments users made on the topic of transferring RCS onto a PC in-house.

E. WESTERN EUROPE AS A WHOLE

1. GROWTH OF PCs

- Exhibit IV-15 shows the breakdown of the business PCs installed by the present respondent sample in mid-1983. IBM had just overhauled Apple in first position, largely on its acceptance in large companies in the U.K. and elsewhere.

- The average expenditure growth rate quoted was +57% over a responding group of 67 users.

- Exhibit IV-16 shows the ranking of the twelve most frequently mentioned important PC applications. Accounting (and bookkeeping) tops the list followed by the three applications most often associated in the popular mind with personal computing:

EXHIBIT IV-14

USERS' COMMENTS ON THE TRANSFERAL OF RCS APPLICATIONS IN-HOUSE - ITALY

- "We could only eliminate our use of RCS by buying a mainframe, and we have no plans to do that at the moment."
- "No, our objective in reducing RCS would be to install a database in-house."
- "We have some high-volume transaction processing that can't be done on a PC."
- "We got our PC some time ago for a particular application, energy-saving statistics, and now that we have developed a 'production' system, we will transfer it soon to a new minicomputer bought for the purpose."
- "Our computation load requires RCS."
- "The alternative to RCS would be a small business computer or small mainframe."
- "We didn't consider RCS but bought a PC for a specific application, oil consumption records."

EXHIBIT IV-15

RESPONDENTS'
1983 PC USE BY BRANDS AND COUNTRIES
WESTERN EUROPE

SUPPLIER COMPANY	BRAND INSTALLATIONS (UNITS)				
	U.K.	FRANCE	WEST GERMANY	ITALY	Total
ICL	61	-	-	-	61
Hewlett-Packard	23	51	2	2	78
Superbrain	7	-	-	-	7
Sirius	14	101	4	5	124
Tandy	1	10	1	2	14
Apple	144	203	19	22	388
IBM	233	135	11	13	392
Commodore	46	51	6	7	110
Digital	1	6	1	1	9
CII-HB/R2E	-	12	-	-	12
SKS	-	-	3	-	3
Olivetti	-	-	-	32	32
Other* or Not Specified	273	277	39	49	638
Total	803	846	86	133	1,868

* Includes: Televideo, Triumph Adler, Philips, Sharp, Sord, Rair, NCR, Burroughs

EXHIBIT IV-16

THE TWELVE MOST USED PC APPLICATIONS
WESTERN EUROPE

APPLICATION AREA	MENTIONS			OVERALL RATING
	1ST	2ND	3RD & OVER	
General Accounting	11	9	3	54
Spreadsheet (VisiCalc, etc.)	11	7	1	48
Word & Text Processing	10	6	5	47
Financial Planning	7	9	6	45
Industry Specific	9	7	3	44
Management Reports	4	5	1	23
Scientific/Technical Calculations	5	2	2	21
Order Processing/Stock Control	4	3	-	18
Local File Handling	1	3	9	18
Payroll	2	3	3	15
Marketing/Sales	4	-	3	15
Personnel/Human Resources	1	2	-	7
Other* or Not Specified	9	7	7	48

*Includes: Production systems, database inquiry, general office automation, communications.

- Spreadsheet manipulations (VisiCalc, etc.).

- Word processing.

- Financial planning (for small-scale problems and models).

- Notable by their low ranking are the marketing/sales applications.

- Expected to rise in importance over the next three years are:

  - Production systems.

  - Database inquiry.

  - General office automation.

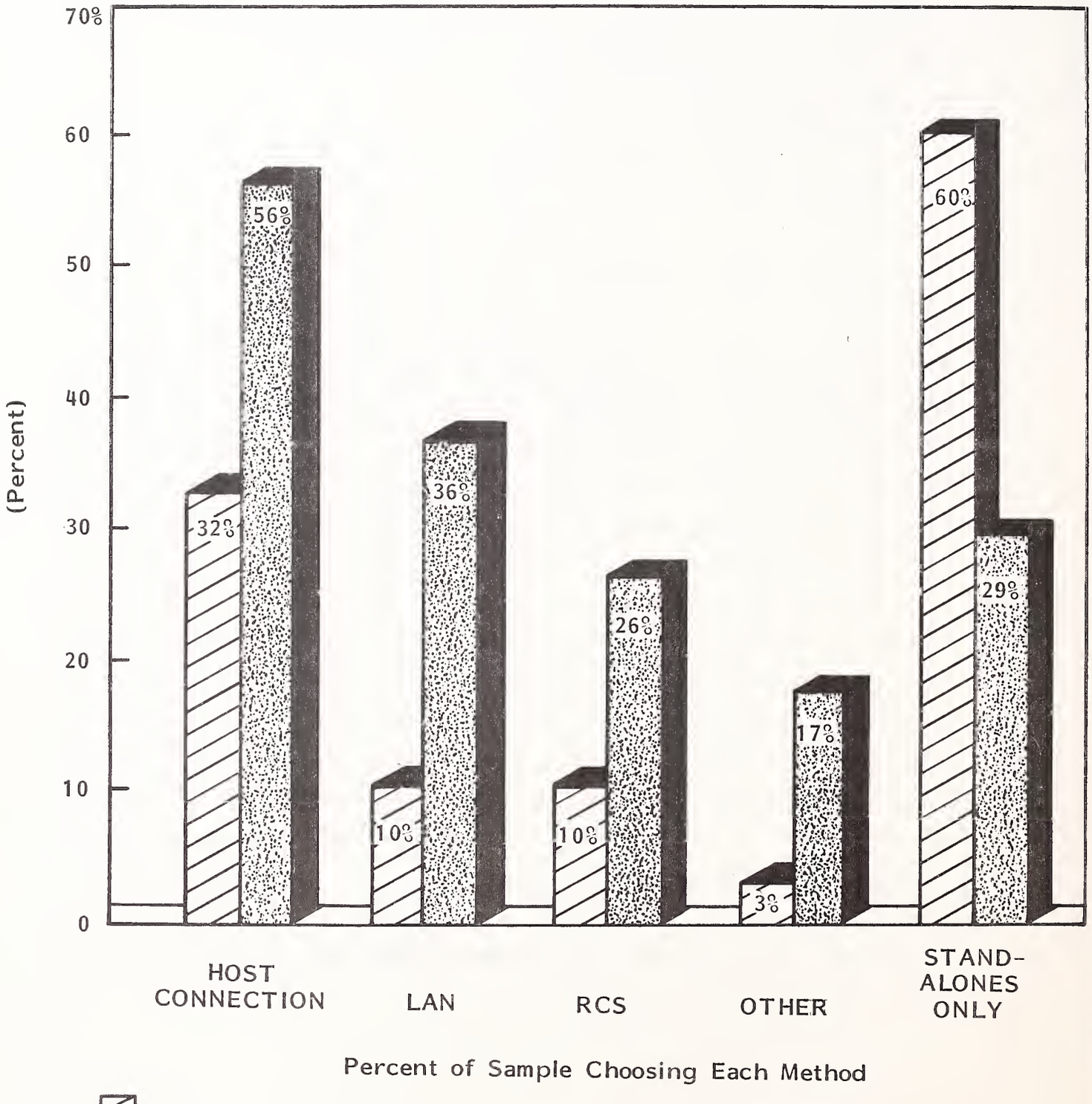
- At the present time RCS is equal second with LANs as a preferred method of interconnecting PCs. By the same time next year, although the proportion of networked machines will be much greater (an increase of 30%), LANs will have drawn ahead of RCS and will clearly be second to host computer networking, which though still the most often chosen method, will be losing its lead in percentage terms.

- The RCS market share of network connections will have increased by only 1.5%, whereas LANs and other modes will have scooped up the remainder of the 18% lost by host networking. This is very obviously a loss of RCS growth potential, and it is caused by the active part with which DP management in Europe is creating the second tier in the modern hierarchical company network without considering the RCS vendor as a natural supplier of data communications services.

- Exhibit IV-17 illustrates the changing market shares in the PC interconnection market, between mid-1983 and mid-1984.

EXHIBIT IV-17

SHORT-TERM GROWTH OF PC NETWORKING –
WESTERN EUROPE



2. IMPACT OF PCs ON RCS REVENUE

- The overall spending of the RCS users in our sample rose by 20% to 25% over the last 12 months. However, it is predicted by the respondents to fall by about 5% in the coming year.

- It may be possible to discount some of this forecasted decline for a number of reasons:

  - Losses were significant for some of the large users.

  - End users have difficulty in estimating the size of some of the problems submitted to RCS processing.

  - Information systems management is known to be loathe to admit to substantial external expenditures.

  - More users anticipated growth (51%) than decline (27%) or a stable budget position (22%).

  - New users to replace any lost users cannot easily be detected by a finite sample.

- Nevertheless, RCS suppliers should not be tempted into complacency or a narrow market stance.

- The installation of PCs is not always perceived by users as a source of reduction of RCS expenditures, though a significant minority do target this objective specifically.

- Respondents answered with a great variety of replies in naming factors that had or might in the future have some influence in getting them to transfer from RCS to PCs. Exhibit IV-18 ranks these replies by number of mentions:

EXHIBIT IV-18

IMPORTANT FACTORS IN THE DECISION TO INSTALL PCs
WESTERN EUROPE

APPLICATION AREA	MENTIONS			TOTAL
	1ST	2ND	3RD & OVER	
Cost Effectiveness and Payback	10	5	7	22
Flexibility/Under User Control	9	9	–	18
Fitness to Particular Tasks	8	3	3	14
Speed of Access to Results	4	4	2	10
Convenience/Ease of Access	5	2	3	10
Suitable Application Software	2	5	1	8
Ability to Network	3	1	4	8
Staff Morale/Job Enrichment	2	2	3	7
User Friendly/Ease of Use	3	2	1	6
Productivity/Reduction in Need to Recruit	2	1	2	5
Applications Backlog	4	–	1	5
Speed of Implementation	2	3	–	5
Others*	8	8	3	19

*Includes: compatibility (e.g., of operating systems), staff education, presentation format.

- The cost aspects were uppermost in their minds.

- Ease of use, productivity benefits, and speed of implementation were surprisingly low on the list, considering the amount of play that is made with these aspects in the sales pitches of both the traditional computer supplier and the new style of marketing PCs.

- When an RCS supplier thinks of effecting market entry to the PC-RCS product sector, these factors should be carefully evaluated in planning both strategy and tactics.

V VENDOR ANALYSIS

V VENDOR ANALYSIS

- The sample of 36 vendors interviewed included 11 of the top 30 computing services companies in Europe. With total computer services revenues of over $1.5 billion dollars and RCS revenues of over a quarter billion, it commands an 8% market share of the total market in 1982 and a 13% share of the equivalent RCS portion.

A. IMPACT OF PERSONAL COMPUTERS

- Personal computing was common well before the advent of the personal computer. The concept of timesharing the resources of a large computer through the medium of interactive terminals was started in the early 1960s in the U.S. and arrived in Europe around 1965.

- It was originally triggered by the desire of professional staff to have access to computer power without having to go through the EDP department and its formalised procedures. Once off, problem-solving has never returned to explaining a specification to a third-party problem-solving professional.

- In the intervening period this early convenience computing has grown into the worldwide remote computing services industry, totalling over $10 billion in annual revenues by 1982. At the same time it has lost some of its reputation for convenience and has acquired the label "remote."

- This loss of position in the popular mind has been partly due to the comeback of the central DP department - using the banners of information systems and information centres, but it has been due even more to the sales explosion of computing engines costing less than $5,000. RCS has been off the centre of the stage for some time now.

- RCS vendors first started to feel a threat to their long-term prospects when their larger customers began to migrate to in-house minicomputers after a certain expenditure threshold had been reached. This became a common phenomenon in the middle and late seventies, and it induced a defensive reaction from the timesharing companies. Thus was born on-site, or user-site, computing services.

- This general move back into the users' premises, deaccentuating the strengths at the remote centre, was implemented from the start in Europe on a cheaper range of equipment than in the U.S. This was particularly so in the case of those bureaux offering DP services to small and medium-sized first-time business users. Whereas their U.S. counterparts would be trying to sell reasonably sized DEC System 10 configurations with RCS connections, the major European vendors were induced to offer minicomputer-based stand-alones for routine daily processing on-site and diskette transfer of data to the host machine for periodic processing - monthly statements, management reports, etc.

- To this extent, and in the business computing end of the services industry in particular, European vendors have been that much more prepared for the recent fast slide in prices at the low end. However, there is a flip side to this attitude - that the potential opportunities presented by PCs may not be sufficiently recognised.

- Out of the 36 vendors interviewed, 47% estimated that they had incurred revenue loss to PCs. Another 11% were reasonably sure that they had lost

some revenue, but could not easily quantify it. The remaining 42% had not lost revenue or felt what had been lost was minimal.

- The amount of revenue lost was largely attributed to standalone sales (87%) rather than to other competitors' PC-RCS solutions (13%).

- The sample had revenues in 1982 of $500 million, of which $328 million was for computing services provided in their domestic markets and $133 million was provided by RCS.

- Seventeen vendors reported losses to standalones and only five to competitive PC-RCS products. From an analysis of their reported losses, the group lost almost 6% of RCS revenues as a consequence of PC-based competition.

- Exhibit V-1 illustrates the applications perceived to be most at risk. Current losses are put down to users with standard commercial applications migrating to PCs. Future losses start to affect financial planning, modeling, and scientific calculation revenues. This is interpreted as an attempt to anticipate the power of 32-bit architecture (supermicros) when it becomes more widespread in the microcomputers on offer, as shown in Appendix C. One technical manager commented that : "The services industry has not felt anything yet. The 32-bit machines will stand it on its head."

- Vendor management remained sanguine in the face of the PC threat. Most saw the PC as a yet unexploited opportunity, but did not appear in a hurry to move to an aggressive posture. Exhibit V-2 shows a selection of their comments on this fundamental issue.

EXHIBIT V-1

APPLICATIONS MOST AFFECTED BY PCs
(By Frequency of Vendor Mentions)

A. Greatest losses in the past 12 months:

1. Accounting
2. Payroll
3. Order Processing/Stock Control

B. Most vulnerable to PC inroads:

IN THE NEXT TWELVE MONTHS	IN THE NEXT THREE YEARS
1. Financial Planning and Modeling	1. Accounting
2. Accounting	2. Financial Planning
3. Order Processing	3. Scientific and Technical Calculations
4. Management Reports	4. File Handling (Local)

EXHIBIT V-2

VENDORS' COMMENTS ON THEIR PERCEIVED LOSSES TO PCs

- "Our share of the payroll market is in fact picking up now. It hasn't suffered from the micro, though accounting customers have certainly been lost."
- "Our project management (PERT) business was batch-oriented and fell away to PCs very rapidly."
- "Small commercial users, e.g., for our mailing package, have drifted away."
- "We have been concentrating more on providing total solutions. We have not seen any of this type of customer moving to a PC."
- "Though I get loss reports, they don't stick in my memory. We are still experiencing an overall high growth rate of around 30%."
- "We lost a fair percentage of revenue, but now we are starting to hear of the disillusioned first-time buyers who can't find the right software."
- "No, our losses are to the commercial minicomputer suppliers when a customer goes in-house with a multi-user system."
- "Many PCs are doing off-line data capture work for us. In this way they are bringing us further revenue, not taking it away."
- "New customers hesitate to sign with us until they've checked what they might get for their money with a PC. Not so much a loss, as a delaying factor."

B. VENDOR RESPONSES

- The majority of vendors claimed to have a current PC-RCS product on the market. Exhibit V-3 shows how the existing situation, where 64% have at least one current product on the market, will change over the next year.

  - Twenty-five percent do not anticipate entering the field.

  - Forty-two percent (consisting of existing suppliers) expect to go on enhancing their present systems or to develop new ones.

  - Seventeen percent of respondents are still debating the question; some 3% of them have an existing PC-RCS product and are considering whether to add to it in some way.

- The general feeling among product development managers was that they had not yet received enough definitive feedback from the marketplace. Existing ranges of product had still to produce some significant messages one way or the other. There are exceptions, where the products are being received with enthusiasm, and these relate chiefly to basic commercial applications for small users.

- Two different approaches to the new market emerged:

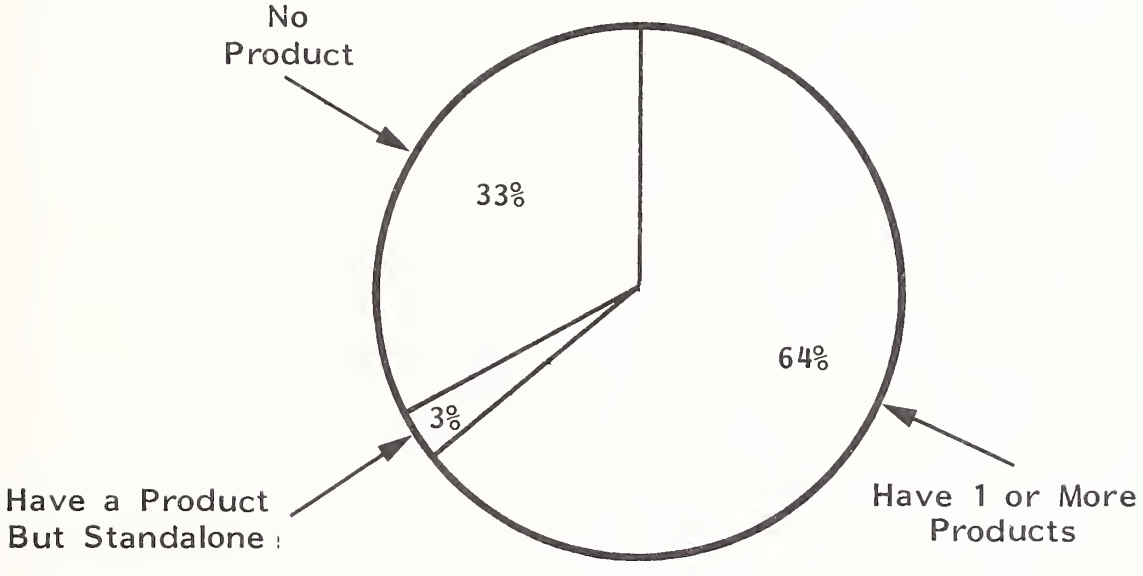
  - The PC can be regarded as a tool for extending the saleability and attraction of the traditional services provided by RCS.

  - The PC is a vehicle for tapping the systems market for small users and represents an enormous new area.

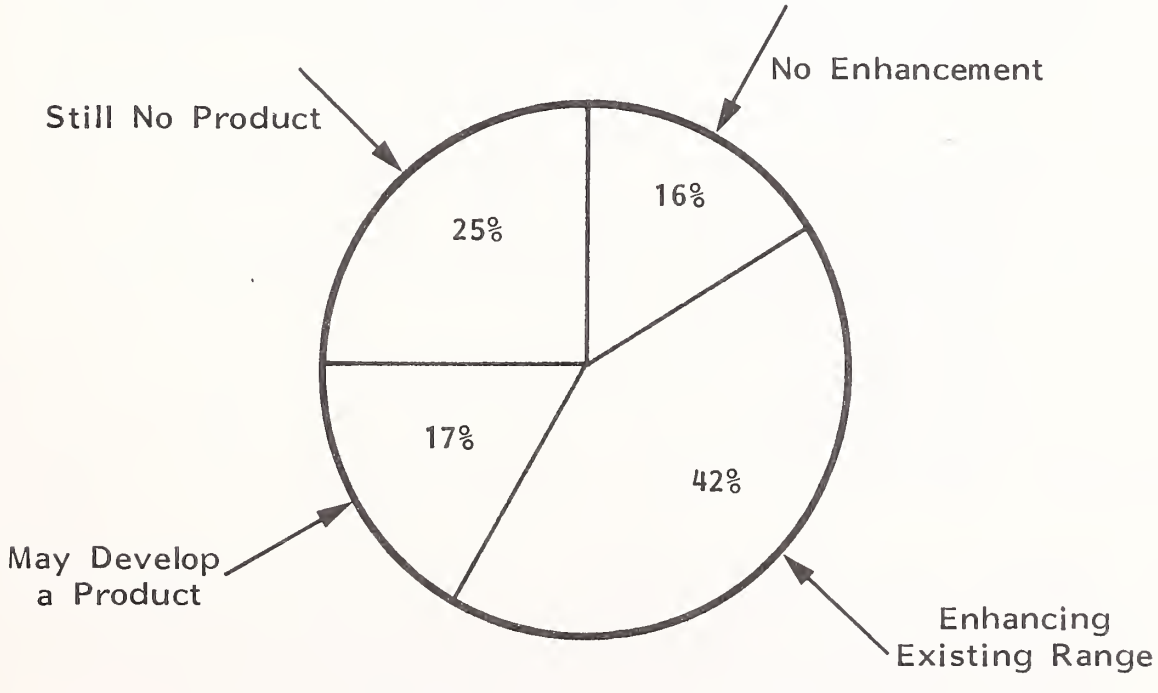
- Traditional timesharing vendors are taking the first approach, which amounts to a static defensive posture. On the other hand, the philosophy of embracing

EXHIBIT V-3

VENDOR SAMPLE BREAKDOWN WITH RESPECT TO
PC-RCS PRODUCT MARKET ENTRY



1983 Breakdown



Developments 1983 to 1984

the PC and micro, and using them for all they are worth, is less common. It is confined to the few vendors who have preserved a balanced and coherent mix of business between software and services.

- Only one vendor was found to have opted for the strategy of providing software products only, and even he expected to be giving a fuller service in later products.

- Exhibit V-4 lists some of the comments elicited from vendors on their immediate plans.

C. CURRENT AND PLANNED PC-RCS OFFERINGS

1. CURRENT PRODUCTS

- The 47 products studied came from 25 different vendors who were, therefore, responsible for an average of 2 each.

- The table below gives their breakdown by country and by general type:

	France	U.K.	West Germany	Italy	All
- Business systems (cross-industry)	6	6	11	2	25 (53%)
- Communication and data entry	2	4	-	-	6 (13%)
- Industry-specific	2	2	5	1	10 (21%)
- Other	2	3	-	1	6 (13%)

- Standard small business systems of a cross-industry nature predominate, especially in West Germany, where telecommunications charges tend to make the use of the RCS link a minor component of the service.

EXHIBIT V-4

VENDORS' COMMENTS ON
THEIR IMMEDIATE PLANS

- "We are not making any comment on whether we shall be offering software products for standalone micros."
- "We shall launch some pilot projects in 1984. Our main concern is how to get the charging mechanism right."
- "Having done some work with small users, we find it is not our type of business. Our acquisition in the turnkey micro systems field is being run independently within the group."
- "Our enhancement programme is just a natural progression in developing user-site capability linked to our network."
- "We intend to offer Minitel-based services in the next year; but Minitel is really pretty dumb!"
- "Many users don't realise the escalating costs of software and peripherals when they buy standalones."
- "We shall develop vertical markets on PC-RCS."
- "A product for professional institutions will be launched."
- "Our philosophy towards PC-RCS is to allow micros to be connected easily to our network, not to develop micro applications."
- "We want to develop PC-based tools for using our RCS network."

- Industry-specific products are aimed at industries like the automobile, publishing, and professional firms (accountants, solicitors, tax consultants).

- Exhibits V-5 summarises the analyses of the product features:

  - In 90% of cases vendors will supply the PC hardware and in 66% will maintain it themselves or through an associate company in the same group.

  - Of the 10% where they don't supply the hardware, in eight percent they will still maintain the software, which in the majority of the cases is built in-house (83%).

  - This predilection for writing software rather than purchasing it on the open market reflects the vendors' low estimation of existing, openly available products and their feeling that software is the added value that they can bring to bear. This assumption needs to be examined closely and fully justified because:

    . It will increasingly affect the speed with which new products can in the future be brought to market.

    . It will continue to require ongoing investment in development, maintenance, and support.

    . 16-bit PC software will soon start to grow in variety and quality.

  - User training is viewed as another area of importance justifying added value. In one case, however, the vendor was sure that the future of low-end PC-based products lay with self-tutoring systems, which were simple enough to require no face-to-face implementation assistance.

EXHIBIT V-5

CHARACTERISTICS OF EXISTING AND PLANNED PC-RCS OFFERINGS

CHARACTERISTICS	SERVICES	
	EXISTING*	PLANNED†
1. Hardware Included	90% Yes 10 No	79% Yes 11 No 10 Undecided
2. Software Resident or Downloaded	60% Resident 30 Downloaded 10 Both	54 Resident 29 Downloaded 14 Both 3 Undecided
3. PC Performs a Major Part of Processing	72% Yes 19 Major or Other 9 Minor or Terminal Only	50% Yes 21 Major or Other 25 Minor or Terminal Only 4 Undecided
4. Mainframe Database Access a Major Feature	20% Yes 6 Major or Minor 74 Minor Only	32% Yes 4 Major or Minor 61 Minor Only 3 Undecided
5. Communications Between User Company Sites a Major Feature	9% Major or Minor 91 Minor Only	29% Yes 7 Major or Minor 61 Minor Only 3 Undecided

* 47 services examined

† 28 services examined

Continued

EXHIBIT V-5 (Cont.)

CHARACTERISTICS OF EXISTING AND PLANNED
PC-RCS OFFERINGS

CHARACTERISTICS	SERVICES	
	EXISTING*	PLANNED†
6. Main Hardware		
DEC	13%	11%
IBM PC	13	18
Televideo	13	-
Sirius	6	4
Triumph-Adler	6	-
ICL	4	4
A Variety of PCs - Any	4	-
- All Main	4	7
Other PCs	37	14
Undecided	N/A	39
7. Source of PC Software		
In-house Only	83%	64%
Outside Supplier	15	14
Combination of Both	2	7
Undecided	N/A	15

* Data available on 47 existing products

† Data available on 28 planned products

N/A = Not Applicable

Continued

EXHIBIT V-5 (Cont.)

CHARACTERISTICS OF EXISTING AND PLANNED PC-RCS OFFERINGS

CHARACTERISTICS	SERVICES	
	EXISTING*	PLANNED†
8. Supply Training to User		
Yes	91%	93%
No	9	3
Undecided	N/A	4
9. Hardware Maintenance Supplied		
Yes	66%	53%
No	26	32
N/A but Would Maintain Software	8	11
Undecided	N/A	4
10. Purchase Terms		
Purchase Only	26%	29%
Lease Only	-	-
Rent Only	11	14
Purchase and Other	51	29
All Methods	12	14
Undecided	N/A	14

* Data available on 47 existing products

† Data available on 28 planned products

N/A = Not Applicable

- The choice of main hardware suppliers supports the industry's move towards 16-bit architecture. The absence of Apple- and Commodore-based services reflects the fairly recent entry of most respondents into this marketplace. Only 21% of products was launched before 1982, and 36% was first marketed in the first half of the current year.

  - One vendor had upgraded a product last year to move from Superbrain to Televideo to gain multi-user capability built into its own software.

  - European suppliers like ICL, Triumph-Adler, and Olivetti do not feature prominently.

  - Companies not supplying the hardware were more ready to offer services on a range of machines.

- The preferred charging method is for the user to purchase the hardware and a license fee for the software, and on top of that pay for any RCS time incurred, but over 50% of the vendors would also offer the alternatives of renting the complete hardware/software system or leasing the hardware through a third party and pay only an initial charge for the programs.

- The table below gives the range of prices encountered in each country's products:

			Local Currency		$ (Approx.)	
		Unit	From	To	From	To
-	France	FF	5,000	500,000	$ 750	$ 74,500
-	U.K.	Pounds Sterling	2,000 (250)*	50,000	3,250	80,500
-	West Germany	DM	10,000	200,000	4,000	80,000
-	Italy	LIT	300,000	40,000,000	250	30,000

*S/W only

- Almost three-quarters of the current products are used for major amounts of local processing. This is particularly true of the business system products (which account for over 50% of the sample). Only 9% of products are used principally as a vehicle for accessing the network.

- In 26% of the products the PC system is used frequently for accessing databases held on the RCS mainframe, or it is sometimes used in that way. For the remaining 74% this is a rare activity, indicating that the micro has not yet achieved a great penetration of information retrieval users.

- To an even lesser extent is the PC being used to allow communications between company sites. As might be expected, the 9% of products used frequently for such a purpose illustrates the low use of RCS in Europe for electronic messaging. The Minitel-based products being offered in France come into this category, but they do not have the added capability of local processing. At the present time these two needs are being satisfied by different types of equipment.

- Exhibit V-6 gives the breakdown of five major characteristics of the target markets perceived by the vendors:

  - Industries.

  - Applications.

  - Departments within organisations.

  - End-user staff levels.

  - Size of company.

- Some 40% of the current products are targeted as cross-industry and designed as such. Taking this in conjunction with the table given earlier derived from

the general description of each product, it is clear that some vendors have cross-industry products but are selling them into specific target markets that they know. This is happening in another 39% of cases, leaving only 21% as true industry-specific, industry-tailored systems.

- Several systems are targeted at more than one industry and at more than one application (as shown by the fact that percentages in Exhibit V-6 add up to more than 100%). Standard business applications like order processing, invoicing, and stock control, accounting of all types, and even payroll are all major target application areas for the PC.

- Purpose-built vertical market systems exist in 21% of systems. Industries targeted are:

  - Accountants, lawyers, and publishers in the U.K.

  - Accountants in France.

  - Accountants, bookshops, and garages in West Germany.

- The majority (57%) of products are aimed at organisations with less than $100 million in revenue.

- Finance and planning share the lead as most important end-user departments, with operational (line) departments. Each has 62% of the mentions for target groups.

- The final end users themselves are most often clerical and secretarial staff (53% of cases cater to this level of staff).

- The ranges of price charged in each country are wide. In the narrowest case, West Germany, the ratio of top end to bottom end is 20, while in Italy it is 120. A contributing factor in the high cost at the top of the price range is

EXHIBIT V-6

MARKETS FOR PC-RCS OFFERINGS

MARKET FEATURES	PRODUCTS	
	EXISTING*	PLANNED†
1. Industries Targeted		
Manufacturing	36%	29%
Distribution	15	18
Banking and Finance	2	21
Services	28	11
Government and Other	6	14
Cross-industry	40	29
2. Applications Targeted		
Order Processing	48%	25%
Accounting	33	18
Payroll	19	-
Financial/Planning	15	21
Word and Text Processing	6	18
Other	10	43‡
Industry-specific	21	32
3. Departments Targeted		
Operations	62%	48%
Financial/Planning	62	43
Administration	11	29
Other	11	21

Continued

* Data available on 47 existing products

† Data available on 28 planned products.

‡ Includes: Marketing/Sales, Management Information with multiple mentions.

EXHIBIT V-6 (Cont.)

MARKETS FOR PC-RCS OFFERINGS

MARKET FEATURES	PRODUCTS	
	EXISTING*	PLANNED†
4. Type/Level of Staff Targeted		
Clerical/Secretarial	53%	29%
Managers and Directors	26	18
Professionals, Executives, Engineers	23	25
Operators and Factory Staff	19	18
5. Company Size Targeted		
Over $500 Million	9%	7%
$100-500 Million	11	11
Under $100 Million	57	36
More than 1 Size (or Undecided)	23	46

* Data available on 47 existing products.

† Data available on 28 planned products.

‡ Includes: Marketing/Sales, Management Information with multiple mentions.

that several vendors have built clustered multi-user systems on machines such as the Altos.

2. PLANNED OFFERINGS

- Twenty-eight products were reviewed:
  - Six from five companies in the U.K..
  - Nine from five companies in France.
  - Twelve from eight of the West German firms.
  - Five from four suppliers in Italy.
- Exhibits V-5 and V-6 combine the summary characteristics of the planned offerings with the current products. Since the new products are all planned to be launched by the end of 1984 (except for three that have no firm launch date), their effect on the market will be largely additive to the current products, which have a two to three year product life still to complete, depending on the exact date of introduction of each. The exhibit data should be read with this in mind. The right-hand column is an addition to rather than a substitution for the left-hand one. Obviously there are a good number of key features that management has not yet decided on.
- The most important of the undecided issues is undoubtedly the brand of PC to run the service on. Thirty-nine percent of products are in this position, and in 10% of cases it is an open question whether hardware will actually be part of the offering.
- Downline loading of software is currently most common in France and West Germany, but it will be featured more often in future British and Italian services.

- There are trends evident towards:
  - Greater use of the PC as a feeder to the RCS network.
  - An increase in access to proprietary database information.
  - Increased use of electronic mail to connect PCs on different user company sites.
- It is to be hoped that suppliers of prospective systems have done their market research "homework" in establishing the local needs for these uses, which may increase or replace existing revenues.
- The IBM PC is being used as the most common PC in planning new services, and tends to draw ahead of Digital.
- There are some grounds (from the figures dealing with sources of software) for believing that suppliers will in the future be more likely to buy or commission software outside than to develop their own. This is a trend to be encouraged.
- Training remains a perceived requirement.
- Hardware maintenance is in the future going to be contracted more via third-party (TPM) companies.
- In the type of markets addressed, industry-specific services are being introduced in greater numbers. The 11% gain in mentions of vertical applications is mirrored by an equivalent fall in cross-industry approaches.
- New departments in administration and elsewhere are now being looked at, while systems will become more accurately focused on particular types of end users.

- There is some attempt to market towards the larger companies with a greater number of products, but several vendors are undecided on this point.

D. SOME PC-RCS OFFERINGS FROM MAJOR VENDORS

- The six sets of vendor offerings described in this section have been chosen to represent typical products from major companies in each of the four countries.

1. SLE AND SLS FROM SLIGOS S.A.

a. The Company

- Sligos is, by 1982 revenues, the sixth largest computing services company in France, with consolidated revenues of 455 million French francs. Its major shareholder is the bank, Credit Lyonnais, and with this background Sligos is strong in the banking and financial areas, in which it gathers some 35% of annual revenue.

b. PC-RCS Products

- Since the beginning of 1982, Sligos has been marketing under the banner of "distributed processing" a number of microcomputer-based products that can be used in varying degrees as standalones or as network interfacing terminals.

- Having a DEC-based mainframe network, it was natural for the company to choose Digital DDP equipment, the PTS 100, as the hardware vehicle, when the SLE product was launched in early 1982. After the DEC launch of its Rainbow and Professional PCs in Europe during the same year, the second Sligos product, the SLS system, was built around the Professional, which also

supports Winchester drives. Sligos puts its own logo on the computers, known as the Teleordinateurs SL90TX, SL280, and SL290.

- Both systems are aimed at the same small business (PME in France) market:

  - SLE caters to accounting ledgers, stock recording, invoicing, payroll and sales statistics. Day-to-day processing is performed in the user site, while more periodic work, such as updating of ledgers and monthly statements, is carried out on the Sligos mainframes, which are situated in regional centres around France and interconnected via Transpac.

  - SLS is a system providing the same functions but with more comprehensive software and more processing performed locally.

- There is also a version marketed to local accountancy firms to aid them in preparing client accounts.

- The systems, including hardware and software, retail for between 50 and 100 thousand francs, depending upon configuration and software modules chosen. Renting or leasing is available as well as purchase.

- Sligos builds its own software.

c. Marketing Strategy

- Sligos puts great emphasis on providing small customers with a full service, including:

  - Selection and sizing of equipment.

  - Implementation of applications.

  - On-site training, or central training at Sligos education centres.

- Responsibility for maintenance.

- Troubleshooting.

- A users' club, APRIMEX, run in collaboration with one of the accounting bodies.

- Access to Sligos' marketing databases.

- Word processor enhancements.

d. Future Trends

- The company is fully committed to serving the small business user and, therefore, expects to sell several thousand of the SL systems in the next three years. Over this period some 15% of its revenues will be earned from this source.

- As certain of its big rivals in France, notably SG2 and GFI, have had difficulty earning profit from small business users and have as a result tended to concentrate on their larger customers' requirements, Sligos has entered the market in France with a good product and service at the right time. At this point it commands a lead in this particular segment.

2. MICRODIAL FROM TELESYSTEMES

a. The Company

- Telesystemes is in the top 12 French computing services companies with revenues of 355 million French francs. It is organised in three divisions:

- TS Ingenierie, by far the largest, which undertakes facilities management projects for data centres and telecommunications networks in France and overseas.

- TS Questel, which acts as the bibliographic database host centre to over 30 well-known proprietary databases and is now France's number one in this sector.

- TS Eurodial, which runs a timesharing service from its own central Honeywell-Bull complex at Boulogne, south of Paris, and had 1982 revenues of 31 million French francs.

- Eurodial has developed a PC-based service called Microdial that can be run on all the principal equipments installed: Apple, Commodore, Victor/Sirius, Tandy, IBM, etc.

b. The PC-RCS Service

- Microdial is a piece of software aimed principally at existing owners of PCs, which allows them to use their systems to access the Eurodial network and its range of services:

  - Timesharing.

  - Economic and econometric databases.

  - Electronic mail.

- A number of applications are being recommended to the potential Microdial user:

  - Data concentration from remote sites.

- Private and public database interrogation.

- Telex distribution through Eurodial-Telex network interconnection.

- The software and service is offered for between 20 and 35 thousand francs depending upon the micro version installed. The software is downloaded from the Boulogne host.

c. Marketing Strategy

- Telesystemes is aiming the service, which was opened in December 1981, mainly at two target groups:

  - Large company end users with installed PCs.

  - Professional people like doctors, dentists, and consultants.

- The software operates via a simple command language and is designed to be easily learnt by non-DP personnel. Training is included as an extra.

- Maintenance and an annual update of the software is included. Hardware supply and maintenance are the user's own responsibility.

d. Future Trends

- Telesystemes expects to be launching other more specific micro-based products in the near future. Taken together with Microdial, these could account for 15% of Eurodial's revenues over the next three years.

3. MICROFACT, MICROSSP, AND MICROACCT FROM CMG

a. The Company

- These three products are marketed by the Information Processing division of CMG (Computer Management Group) Ltd., of Croydon, England. CMG is a services company that has always retained a balanced mix of its operations between bureau services, and software and consulting. It markets in the U.K., the Netherlands, Belgium, and West Germany; in its 1982 financial year revenues were over 21 million pounds sterling, split almost 50:50 between the U.K. and the Continent.

- It has been marketing micro-based systems since the end of 1981.

b. PC-RCS Products

- MICROFACT was the initial product. This is a micro-based version of the bureau division FACT service, designed to allow a distributed data processing approach to handling the basic commercial applications of the small companies who had been among CMG's original bureau customers:

  - FACT provides accounting, stock recording, invoicing, payroll (PAYFACT), financial planning, and word processing via files held on the CMB regional mainframes.

  - MICROFACT allows the user to have a Televideo (older systems used the Superbrain) micro in-house, and to do whatever local processing is appropriate on it with the mainframe processing reserved for the larger runs.

- MICROSSP is a PC-based service allowing access to CMG mainframes for running Statutory Sick Pay (SSP) requirements according to the programs resident there. It is also Televideo based.

- MICROACCT is an industry-specific product aimed at practising accountants who need a facility for the preparation of final accounts from incomplete records. Again, it is based on Televideo equipment.

c. Marketing Strategy

- CMG is very much the British analogue of the French Sligos. Both companies have recognised in good time how commercial bureau customers migrate in-house as their business expands and as hardware prices come down. The PC-RCS solution, when offered with good software and all-round support, allows the user to have his cake and eat it. The new benefits of going in-house can be married to the old security associated with a professional services company.

- Commercial policy is more rigid than for its French counterpart. CMG only rents its micro-based equipment. Maintenance is included in the rental price. Prices for a unit system range between an ISV ("if sold" value) of 2,000 pounds sterling for a minimum SSP system to an ISV of 12,000 pounds sterling for a full MICROFACT configuration.

d. Future Trends

- Vertical PC-RCS systems can be expected within the next 12 months.

- As a percentage of total annual turnover, PC-RCS services are expected to rise from a current 12% to 15% over the next three years.

4. UNICOM AND UNIFORM FROM UIS

a. The Company

- United Information Services Ltd. (UIS) is the U.K. arm of United Telecommunications Inc.'s United Telecom Computer Group. Operating from a London city address it provides RCS services and total business solutions mainly to large private and governmental organisations. Over the last four years it has been formed by successive acquisition and merger of the networked services of London University Computing Services (LUCS) Ltd. and Atkins Online. More recently it acquired the professional services wing of Computer Resources Ltd., which went into liquidation.

- Estimated revenues of 10 million pounds sterling in 1982 came chiefly from RCS (80%).

- With a background in technical and engineering services, UIS's entry into PC-RCS comes more as a move to enhance these services than as a diversification.

b. PC-RCS Products

- UNICOM is sold as a microcomputer software product, which allows different micros and PCs to communicate with machines of all sizes and types using the standard timesharing network of UIS. Facilities offered via a simple command set allow for:

  - Use of a micro as a conventional terminal.

  - Data storage on disk from a communication line.

  - Transmission from local disk storage.

- It operates on any CP/M or MSDOS-based micro and costs 250 pounds sterling for a license to use.

- UNIFORM is a data entry utility that is designed to turn a PC into an intelligent terminal, and to be able to work in harness with UNICOM. It costs slightly more.

c. Marketing Strategy

- UIS is committed to becoming a full-service company with management information, consulting, software, and network services all available for custom solutions. For this reason, it is mainly selling to large organisations with already-installed bases of PCs and does not wish to become a vendor of PC hardware.

- The two PC-RCS products are part of a strategy to provide total solutions and to leverage the company's considerable networking expertise.

d. Future Trends

- The aims are to develop further utilities and tools for the general user, based on microcomputers on customer sites.

- With the trend in large companies towards purchase of 16-bit PCs, UIS will be working on software products to run on this later generation.

- United Telecom owns the Megatek Corporation, a U.S. graphics terminal and software company. Though not working yet in conjunction with the RCS service, it is natural that the advent of the 32-bit-based workstation terminal will involve UIS in further product development.

5. DATENPLATZ RM335 AND RM500 FROM RHEIN-MAIN RECHENZENTRUM

a. The Company

- Rhein-Main Rechenzentrum GmbH is the West German subsidiary of Belgium's number one service bureau CIG, itself one of Europe's top 20 service companies, which has grown rapidly by acquisition in the last five years.

- CIG is a subsidiary of the Belgian bank Societe Generale de Banque, which holds a 50% stake.

b. PC-RCS Products

- The Datenplatz RM335 is a first generation product based on the SKS micro that runs on a Z80A under CP/M. It has been marketed since early 1981.

- The system supports data entry, accounting, and word processing with software developed by Rhein Main. A number of CP/M third-party packages are also supported. The system can be purchased for between $5,000 and $6,000, or leased.

- The RM500 system is based on Televideo equipment, costs between $5,000 and $10,000 and has a fuller set of application software including order entry, stock control, invoicing, and accounts. It was only introduced in early 1983.

- Rhein-Main also supplies small business systems based on the HP 250.

c. Marketing Strategy

- CIG in Belgium was one of the pioneers in Europe of the standalone microcomputer installation for the small computer user. Both Belgium and West Germany have telecommunications environments that are unattractive to the small user for cost reasons. Hence much of the communication

between local processing microcomputers doing routine daily tasks and the central services hosts has been by diskette.

- Since the periodic runs which the small businessman requires on a larger machine - statements, debtors listings, mailings, etc. - do not require interactive response times, the off-line connection via diskette has been adequate. This will change slowly.

- Meanwhile, Rhein Main has been deriving less than 5% of its revenues from the PC source, but this could grow to 25% by 1985.

d. Future Trends

- At the moment, Rhein Main is finding too great a disparity between the cost of a reasonably powerful PC and the West German data communications and modem costs to be able to put together a balanced service. The answer to this lies in the production of more sophisticated software to justify the introduction of the RCS link.

6. BUSINESS GRAPHICS FROM CDS SISTEMI

- CDS Sistemi is one of Italy's top 10 services companies with 14 billion lire revenues in 1982, a large component still being earned in traditional batch services.

- The company is offering the ISSCOGRAPHICS business graphics software based on the IBM PC. The PC acts as a front-end and image generator with the bulk of the graphics routines being processed in the linked mainframe IBM at the bureau's centre in Milan.

- The software and hardware can be rented, or purchased at a price of 40 million lire. Training and maintenance are provided by CDS.

- The management believes that PC-RCS products are so far behind the rest of Europe in Italy because of the generally poor state of telecommunications in that country. Nevertheless, there are intentions to launch other products in the future, and the company could be earning 5% of revenues from this source in three years time.

E. SALES STRATEGIES

- Over two-thirds of vendors interviewed were determined to continue to use their existing sales forces to sell PC-RCS services and products either for reasons of laziness or because they were convinced it would be the most cost-effective selling method. Almost one-half of these vendors saw it as only a partial solution, however, and therefore combined some other selling method with the use of their existing salespeople. Exhibit V-7 shows the breakdown of the methods employed by respondents according to the number of mentions given.

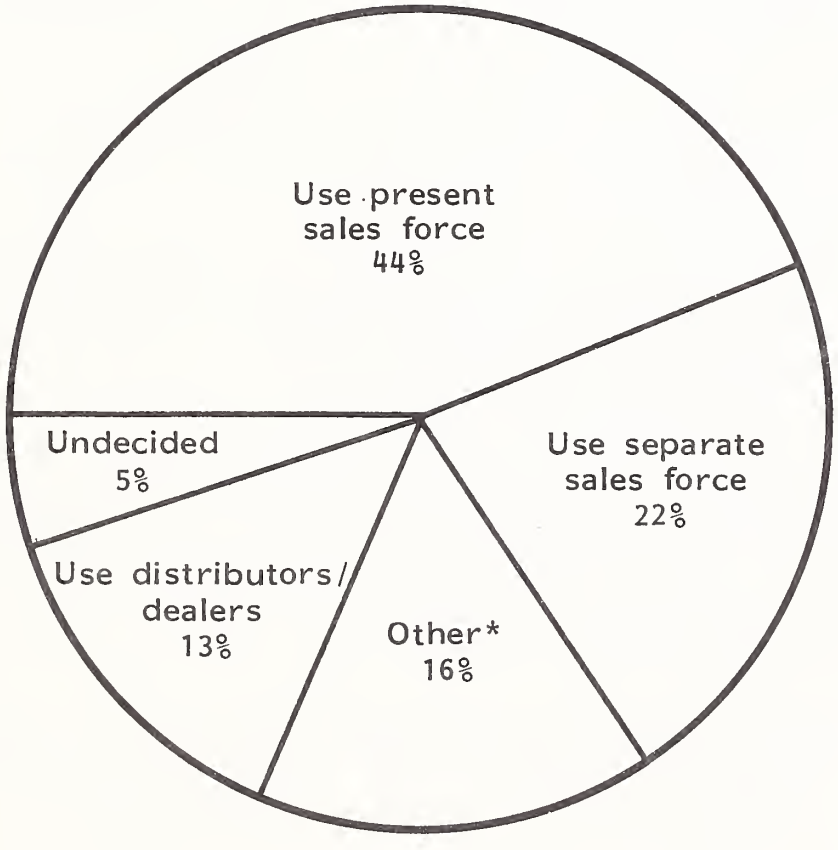
- Examination of the way vendors were proposing to combine the different techniques yielded the following figures:

-	Using only the existing sales force	36%
-	Using existing salesforce in combination	34
-	Using existing salesforce restructured	3
-	Using separate sales forces only	6
-	Using third-party channels only	12
-	Undecided	9
		100%

- Restructuring the sales force along vertical market lines, either in one fell swoop or gradually over time, features in 12% of cases, in 6% of which this organisation would be combined with some portion of the present general "selling-all-products" approach (for non-PC-RCS services).

EXHIBIT V-7

VENDORS' USE OF
VARIOUS SALES CHANNELS FOR PC-RCS PRODUCTS
(Percent of Mentions)



*Includes: Own computer shop, trade associations.

- Other channels found to be used in combination with the existing force were:

  - A temporary experiment with a computer shop or "boutique," where "high street" customers are being sold small-business PCs plus a complete service after obtaining a demonstration in the shop and follow-up consulting visits.

  - One vendor sells PC standalone software products by mail order, advertising in the trade press. This is seen as getting customers on the first rung of the ladder.

  - Two vendors sell PC hardware as standalone units for very much the same reason.

  - One company sells PC and office automation equipment with two separate sales forces and completely separately from any network service sales.

- An enormous variety of answers were given to the question of what vendors perceived as the most important problems involved with the selling of PC-RCS, and an equally varied set of responses to the challenge posed by marketing PC-RCS.

  - Grouping the problems under major headings produced the table in Exhibit V-8, where the three top classes of problems are:

    . Problems associated with how the user views the type of services.

    . The question of how to cost and price the products to contain the support requirements to a level that both user and vendor can live with.

EXHIBIT V-8

VENDORS' PERCEPTIONS OF PROBLEMS FOUND IN SELLING PC-RCS PRODUCTS AND SERVICES

PROBLEM AREA	MENTIONS		OVERALL RATING
	1ST OR ONLY	2ND & FURTHER	
1. Receptivity of User Market	9	8	4.3
2. Pricing, Costs, and Profit Margins	9	4	3.5
3. Product Deficiencies (Usually in Software)	3	8	2.5
4. Convincing Management of the Need	4	-	1.2
5. Finding Suitable Salesmen or Sales Channels	2	2	1.0
6. Other*	1	5	1.3

*Includes: maintenance over a wide geography; precise market definition; hardware manufacturers' lack of comprehension.

- Technical difficulties, most often to do with the lack of quality software, especially for communications.

- Notable by its absence was the problem of educating sales staff to overcome some of these problems. INPUT believes that the majority of suppliers have not yet thought through all the problems associated with marketing PC-RCS. Still an adjunct to most service offerings, vendors must now see that PC-RCS starts to come of age by constructing viable strategies that give the PC and its potential for both standalone and networked applications a central position in the scheme of things.

- The responses to these problems envisaged by the suppliers will be dealt with in the next chapter under the opportunities that exist in each major European market.

VI EUROPEAN COUNTRY MARKETS: ENVIRONMENT AND OPPORTUNITIES

VI EUROPEAN COUNTRY MARKETS: ENVIRONMENT AND OPPORTUNITIES

- The objectives of this chapter are:
  - To examine the possible strategies available to vendor companies already in the RCS market when faced, as they are, with the PC phenomenon.
  - To highlight the different views that users and vendors have on the supply of PC-based services.
  - To review user attitudes to the purchase of PC-based services on the part of users in the four country markets studied and, thereby, to point out the most fruitful opportunity areas open in each.
- This review should be taken in the context of the technological changes in PC products that are likely to occur between now and 1985, as described in Appendix C.

A. INTRODUCTION TO STRATEGY DEVELOPMENT

- Exhibit VI-1 defines four distinct strategies available to RCS vendors:

EXHIBIT VI-1

TYPES OF PC-RELATED RCS STRATEGIES

RCS VENDOR SERVICE	TYPE OF STRATEGY			
	STANDALONE SOFTWARE PRODUCT	LIMITED PC-RCS	TURNKEY PC-RCS	FULL SERVICE PC-RCS
Software				
Not linked to RCS	X			
Linked to RCS		X	X	X
Maintenance	X	X	X	X
Hardware				
Computer			X	X
Maintenance			X	X
Communications				
Value-added Network		X	X	X
Local-area Network				X
Data Base				
Nonproprietory		X	X	X
Proprietory		X	X	X
Support				
Initial Training				
- Remote	X	X		
- Local			X	X
Ongoing Support				
- Remote		X		
- Local			X	X
Consulting				X

- The PC market can be addressed at the lowest level by offering software products to run standalone on already installed PCs and micros. This strategy can be coupled with the retailing of PC hardware, or it can be thought of as a "toe-in-the water" familiarisation exercise.

- At a slightly higher level of involvement, specific services can be offered without the sale of the hardware itself, for example, for database access or electronic mail.

- The next level involves the sale, installation and maintenance of the equipment and is essentially a turnkey operation with the RCS connection added as part of the application requirement. Vendors will be entering this level of operation with relevant application software that their previous experience and in-house expertise has enabled them to develop or acquire as part of a coherent range of service products. Too broad a PC-related application range is to be discouraged when first attempting this level of service. More important are the supporting activities of installation, training, and maintenance.

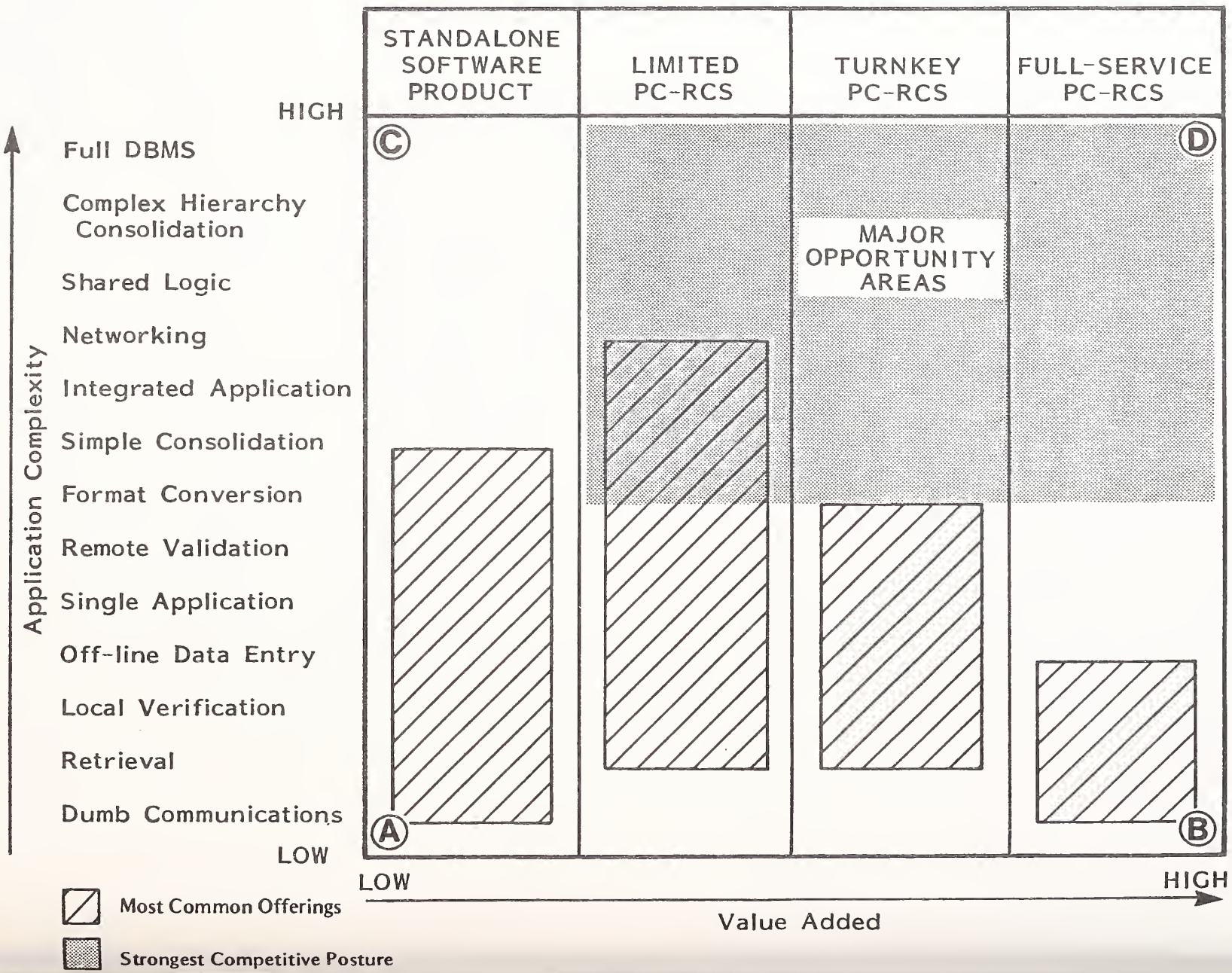
- The highest level of service, "full-service" PC-RCS, is an addition to the previous level of a greater degree of training, consulting, and networking capabilities. At the same time the full-service vendor should be prepared to engage in activities at any of the lower levels if they appear necessary in the light of specific consulting recommendations.

- These four levels, though distinct, imply a progression, each one incorporating (in the best way appropriate to the particular vendor) elements from the lower levels.

- Exhibit VI-2 shows how the most common service offerings are positioned in a chart with two axes - the horizontal axis showing the four strategy levels as functions of increasing added value, and the vertical axis giving application complexity (which is related to cost).

EXHIBIT VI-2

POSITIONING OF PC OFFERINGS BY RCS VENDORS



- Today's products are exploring areas close to the horizontal axis, quadrants A and B. Quadrant D represents the uncharted territory where the strongest competitive advantage and greatest risk lie. The main use of the diagram to vendors is to allow them to fix their present position and to set their course for whichever quadrant they wish to get to.

- The majority of vendors have not yet determined a long-term strategy. The volatility of the market has encouraged a policy of wait and see. The advantages of grasping the nettle and adopting a well thought through and aggressive strategy are plain to see in terms of the penetrations that PCs are predicted to make in the RCS sector (see Exhibits III-1 and III-2).

- Vendor and user perceptions of their requirements for PCs over the next three years are curiously at variance. While it is not true to say that users always know what is good for them, it is a measure of a vendor's marketing success that he and his customer base see reasonably closely eye to eye on most topics related to the products supplied. Exhibits VI-3 and VI-4 illustrate the divergence of perceptions between the 36 vendors in the respondent sample and the 81 users, over priorities in future PC requirements:

  - The top five items on the vendors' listing are all in the lower half of the users' rating.

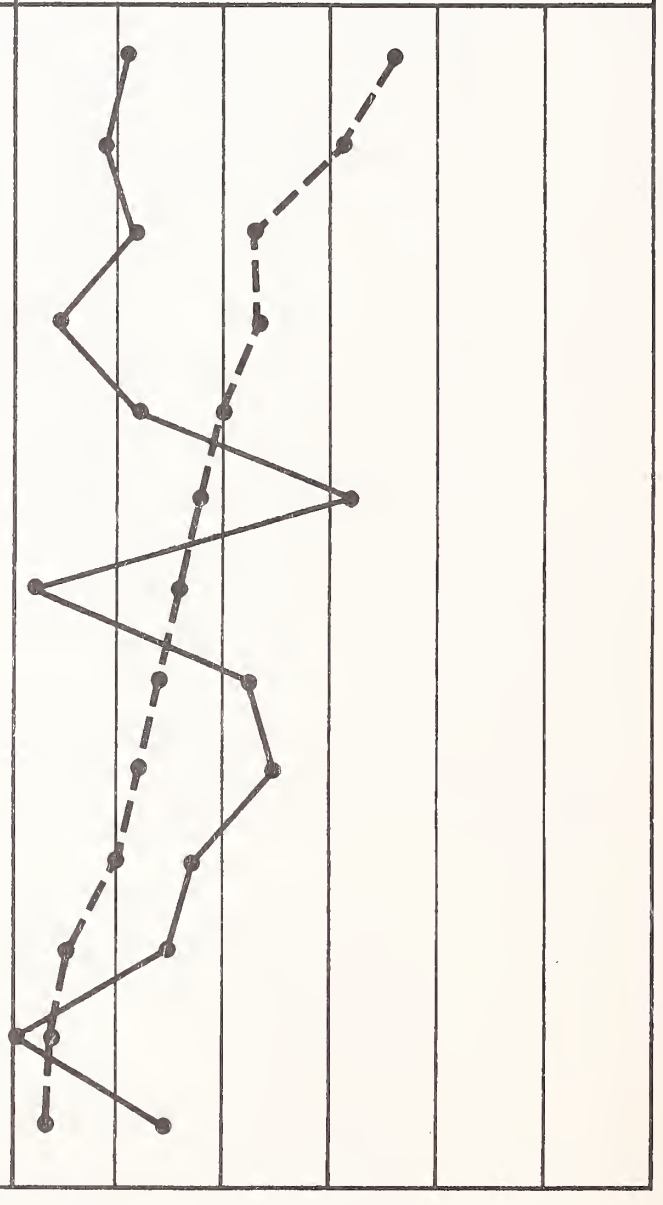
  - The vendors have the opposite view to users on the relative importance of access to external data bases rather than the internal database of the company.

  - Vendors have almost the completely opposite order of priorities in communications requirements, putting communicating with other companies first where users rank it third in comparison with communications with remote sites and with other departments on the same site.

EXHIBIT VI-3

VENDOR ORDERING OF IMPORTANT FUTURE PC FEATURES

RANK	FEATURE
1.	User Training From Vendor
2.	Consulting Support by Vendor
3.	Access to External Databases
4.	Software Downloading Capability
5.	Substantial Transaction Processing Power
6.	Access to Companywide Database
7.	Communications with Other Companies
8.	Substantial Analytical Processing Power
9.	Maintenance Provided by Vendor
10.	Communications with Remote Company Departments
11.	Substantial Program Development Capabilities
12.	Communications within a Department
13.	Communications with Other Companies

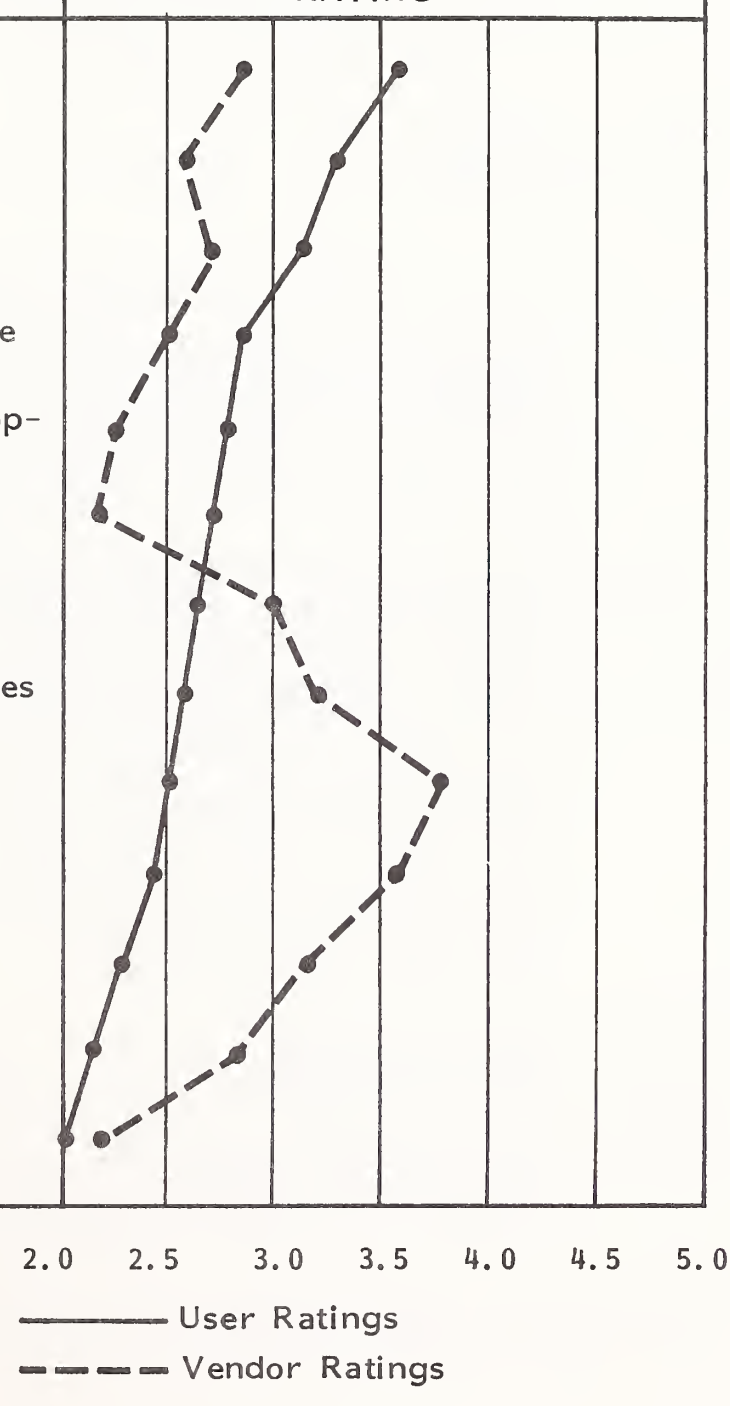


*1 = Low, 5 = High

EXHIBIT VI-4

USER ORDERING OF IMPORTANT FUTURE PC FEATURES

RANK	FEATURE
1.	Access to Companywide Database
2.	Maintenance Provided by Vendor
3.	Substantial Analytical Processing Power
4.	Communications with Remote Company Departments
5.	Substantial Program Development Capabilities
6.	Communications with Other Departments on Same Site
7.	Substantial Transaction Processing Power
8.	Access to External Databases
9.	User Training From Vendor
10.	Consulting Support by Vendor
11.	Software Downloading Capability
12.	Communications with Other Companies
13.	Communications within a Department



*1 = Low, 5 = High

- It is hard to escape the feeling that vendors are giving high priority to the things they know how to do now or can implement soon at reasonable investment levels - evidence of tactical rather than strategic thinking.

- The methodology for deriving a viable PC strategy for the long term is discussed more fully in INPUT's companion report on the U.S. market, Personal Computer Opportunities for Remote Computing Services Vendors, June 1983.

B. FRANCE

- Up to the beginning of 1983, the PC was not paid much attention by EDP management in large- and medium-sized companies. This is now changing and integration of mainframe, micro, and "bureautique" applications is now the most important subject on the planning agenda.

- Meanwhile small companies continue to implement inadequate PC-based standalone business systems, especially in the provinces where they are assisted by small software companies, many of whom are also PC dealers, but who cannot be considered financially viable. There have been cases of systems houses of this type that were unable to continue in business because they could not collect their fees for systems that were not functioning to specification. They had underestimated what the small company owner would expect from a working system.

1. USER ATTITUDES

- The three most important factors in deciding to put an applicaton onto a PC (irrespective of whether it was being transferred from RCS) were found to be:

  - That the particular application was judged suitable for a PC.

- That the machine would be under the user's own control.

- That low costs made it an attractive decision.

- Typical comments were:

  - "Our mainframe is not flexible enough."

  - "On-site data entry is now possible in our department."

  - "We have closer control of our work."

  - "Reduction of timesharing costs was important."

  - "The software and hardware were available almost at once."

- Other additional reasons given were:

  - More staff became computer literate.

  - More immediate production of financial reports.

  - Speed of application development possible with a local PC.

  - Relief given to central EDP development teams.

- In evaluations of alternative solutions, RCS only features in 20% of mentions whereas the in-house mainframe was considered in 56%: 64% of the users evaluated solutions formally, but only half of these could give a quantified report to assist the decision.

- A comment that expressed the difficulty for some users: "One tries very hard to provide a justification at the level of a well-defined application, but it is not easy before the event."

- One user was content to quantify the evaluation by finding that: "Processing will be faster with a PC."

- In the few cases where PCs had been measured to cause an actual reduction in RCS expenditures, the fall was high, an average of 42% in an average of 18 months. Financial modeling was the application most often transferred.

- The conventional sources of wisdom are still the main sources of information on what PC to purchase, as shown in Exhibit VI-5. The most important ones are management services departments and manufacturers. Dealers and shops are not used much for this purpose.

- The general satisfaction with PCs was at a reasonable level, at 3.6 on a scale of 1 to 5.

2. OPPORTUNITIES

- Exhibit VI-6 gives an idea of the perceived gaps in service provided by PCs, gaps that RCS vendors should examine with a view to filling. Three of the top four shortcomings have less to do with the product than with the way it is sold.

  - Providing RCS vendors can price their services correctly, the ground should now be prepared in the users' minds for the provision of supported services where the final costs are faced somewhat earlier.

  - The key factor is to provide software and support now and be ready to step in with a greater RCS component when the increase in storage capacity or hardware speed becomes urgent.

- Exhibit VI-7 lists in order of mention those application areas considered important by users for implementation on PCs. To the right of the table are shown two associated figures:

EXHIBIT VI-5

IMPORTANCE OF INFORMATION SOURCES IN CHOOSING PC HARDWARE AND SOFTWARE FRANCE

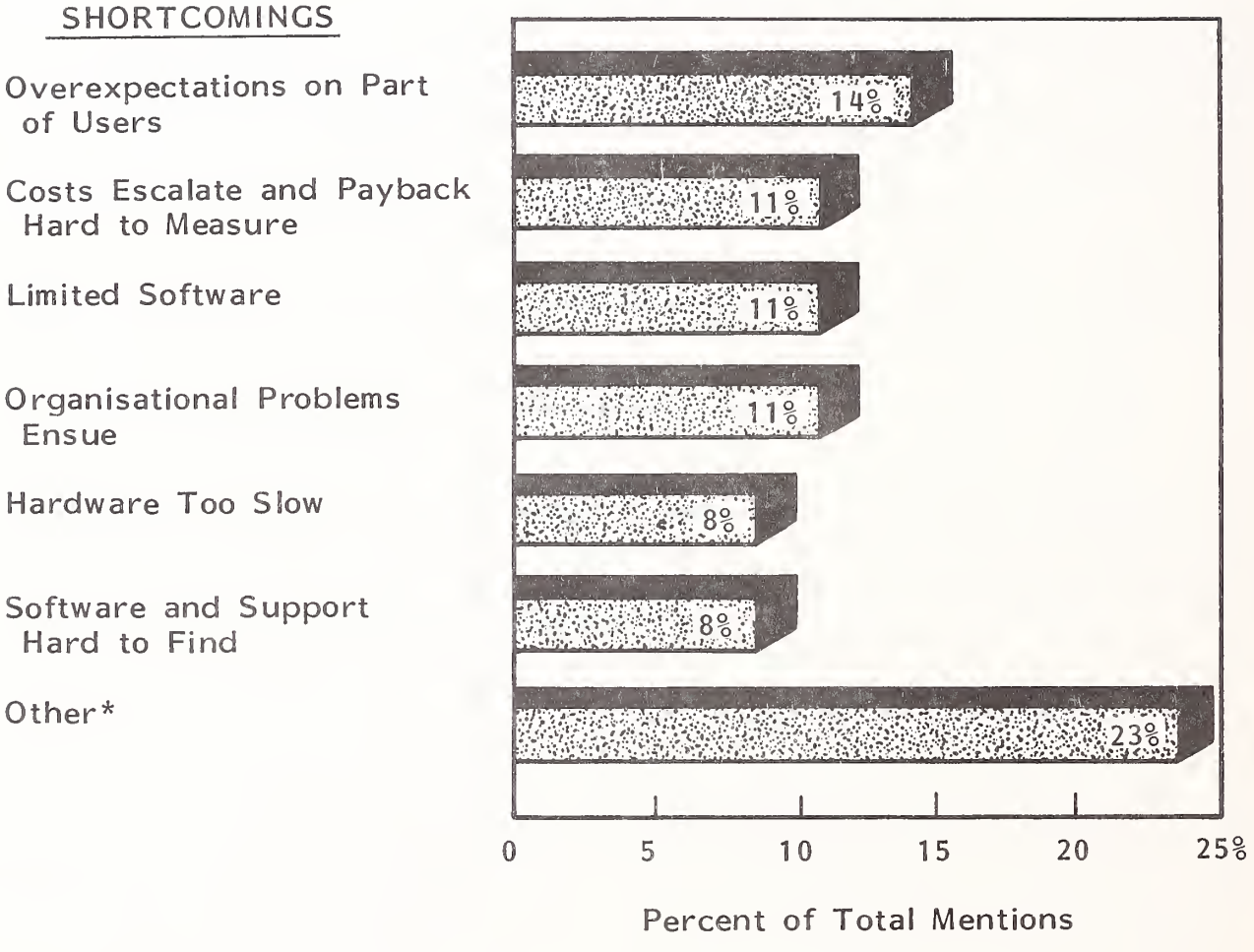
SOURCE OF INFORMATION	AVERAGE IMPORTANCE RATING ON SCALE OF 1 TO 5*
MIS or EDP Department	4.0
Manufacturers	3.0
Trade Publications	2.7
Colleagues and Associates	2.5
Computer Stores/Dealers	1.6
Others: Included SICOB, Conferences, and Seminars	< 1.0

* 1 = Low, 5 = High

Overall reported degree of satisfaction with PCs on a scale of 1 to 5 = 3.6

EXHIBIT VI-6

USER-PERCEIVED SHORTCOMINGS OF PCs
FRANCE



* Includes: Limited disk capacity, high familiarization costs, poor data security.

EXHIBIT VI-7

USER PERCEPTIONS OF IMPORTANT
FUTURE PC-RCS APPLICATIONS
FRANCE

USER RANKING AS FUTURE APPLI-CATION	APPLICATION AREA	VENDOR RANKING AS FUTURE APPLICATION	USER RATING AS EXISTING APPLICATION
1	Financial Planning and Spreadsheet (VisiCalc)	2	2.7
2	Word and Text Processing	5=	1.4
3	Communications	3	N/S*
4	Office Automation	5=	N/S
5	Local File Handling	10	0.8
6	Industry-specific	5=	1.1
7	Accounting	4	N/S
8	Database Inquiry	5=	0.3
9	Scientific and Technical Calculations	5=	1.3
	Other: Includes Marketing/Sales and Management Information	includes no. 1**	

* N/S = not significant
5 = Equal 5th ranking.
** Order processing (vendor ranking)

- The ranking accorded by the vendor respondents on the same question.

- The rating previously given by the users to each application as a current application (see Exhibit IV-1).

- There is a fair degree of accord between users and vendors as to which application areas to target, except for sales order processing, which vendors rank the number one in future, and accounting (their number four). The top five applications indicate classical uses of the PC with an increasing need to link to other machines for office-level, small-scale applications.

- More specialised applications particular to an industry have fallen in importance between users' current and future specifications, as have scientific and technical calculations.

- The top two areas will remain as they are, but the office and telecommunications requirements are starting to make themselves felt, and the installed base of PCs will form a good portion of the infrastructure around which the office applications will revolve.

- External database inquiry still remains as a low priority, in spite of experiencing rapid actual growth.

3. IN CONCLUSION

- France is at a relatively early stage in its installation of PCs and related RCS products. The situation is favourable to RCS vendors becoming major distribution channels for PC-based services in a number of segments and with different strategies over the course of the next three years:

  - Vendors with a large base of small business customers should opt for the turnkey PC-RCS product strategy at once in order to protect their

customer base from future inroads from rivals with PC-RCS general business products.

- Vendors who rely on a smaller base, but of larger scale customers, should opt for the full-service strategy in dealings with top customers and for the limited PC-RCS approach with their smaller customers. This will limit their support requirements and allow for concentration on customers to whom large amounts of added value are valuable and affordable.

- Precise targeting of PC-RCS products will need to be undertaken with the aid of detailed market studies and product testing.

- Specific industries in which there is a buoyant interest in "microinformatique" are:

  - Health care - a greater proportion of disposable income in France is now devoted to medical and dental care, and the profession is very interested in using small-scale computers linked to larger machines for the complex tasks.

  - Agriculture - a lesser proportion of state funding is due to be spent on this industry in future years. There is thus a driving force at work providing an incentive for automation of both technical and administrative applications and the integration of the two types at small-farm level in a PC, linked to larger systems for the interchange of local, regional, and national data.

C. THE U.K.

- Large companies in the U.K. have tended over the last three years to allow and to encourage profuse departmental use of PCs. One of the country's top six companies estimated that it had over 1,000 PCs installed in the U.K. alone, having counted at least 500 two years previously. The top 1,000 ("Times 1,000") industrial companies - with revenues of approximately 30 million pounds sterling and over - account for about 20,000 of the 76,000 business microcomputers installed at the present time.

- With the launch of the IBM PC, these large groups now see a route to standardisation.

- Small companies in the less than 1 million pounds sterling turnover bracket now see a painless (i.e., without large capital budgets) way of entering the world of data processing, long barred to them by the price tag of the small business system (which contained at least five figures of pounds sterling). These inexperienced users are easy prey to the enthusiastic dealer or hardware supplier's salesman. Expecting to have a full function business system under 3,000 pounds sterling, many are now encountering the realities of software, support, and maintenance costs, which larger small companies had met before with the minicomputer.

1. USER ATTITUDES

- Decisive factors affecting the choice of a PC solution in order of importance to the U.K. respondents were:

  - Cost effectiveness.

  - Flexibility inherent in the computer.

  - Staff morale and job enrichment.

- Lesser reasons included:

  - Speed of access to results.

  - Ease of access to local data.

  - Existence of self-contained application requirements.

- In the two cases where RCS expenditure reductions could actually be quantified and quoted, an average of 75% reduction was named. The applications replaced were very mixed but were mainly in the general business category.

- As in France, MIS departments and the manufacturers themselves topped the list of rankings for sources of information on PC selection and installation. Trade publications had a relatively poor rating at 2.0 - behind stores and dealers even. Exhibit VI-8 gives the respondent ratings, at the same time giving the overall satisfaction rating with installed PCs, which was only a moderately good 3.4.

- Evaluation of alternative solutions was carried out formally in 72% of cases:

  - RCS featured in only 24% of evaluation situations, an improvement, if slight, on the French case, but trailing considerably behind in-house mainframe (with 68%) and small business systems (with 40%).

  - Forty-eight percent of users could cite a quantified cost benefit case. Some of the comments describing user approaches to PC solution evaluations are listed in Exhibit VI-9.

2. OPPORTUNITIES

- PC limitations in power, disk capacity, and expandability are the chief complaints raised by the U.K. respondent users. Systems and software

EXHIBIT VI-8

IMPORTANCE OF INFORMATION SOURCES
IN CHOOSING PC HARDWARE AND SOFTWARE
U.K.

SOURCE OF INFORMATION	AVERAGE IMPORTANCE RATING ON SCALE OF 1 TO 5*
MIS or EDP Department	3.2
Manufacturers	2.7
Colleagues and Associates	2.5
Computer Stores/Dealers	2.2
Trade Press	2.0
Other: Includes Information Center Publications, Trade Shows, and Software Houses	1.3

* 1 = Low, 5 = High

Overall reported degree of satisfaction with PCs on a scale of 1 to 5 = 3.4

EXHIBIT VI-9

USERS' COMMENTS ON THEIR PC EVALUATION PROCEDURES - U.K.

- "The payback period is a function of the economic climate. Currently it is less than two years."
- "We expected to save two staff and we did."
- "We use a quantifiable productivity gain indicator."
- "Our use of PCs was planned within a total group hardware and systems design strategy. They weren't out in competition with other solutions at the departmental level."
- "I had to write a justification letter to my boss - the same as for my word processor. It was difficult to quantify. It's saving up to four persons' costs."
- "It was a semiquantified thing. Full evaluation wasn't necessary, but as a matter of policy I compared it with the in-house mainframe solution. It was obviously faster to develop an application on the PC."
- "No, not a formal comparison. We were attracted to the low cost."
- "Can justify it in terms of payback, but it was introduced for specific applications that link to our payroll now done on a bureau. Eventually, and somewhat incidentally, that will come in-house."
- "Target payback period was 18 months. The IBM RCS bureau was charging 17K per annum, so we bought a 34 plus some PCs."
- "There is a procedure. If it's not going to be IBM, there are a lot more forms and you have to be much more precise. Shows savings in man-hours and improved reporting times."

problems also feature three times in the top six of the shortcomings, as listed in Exhibit VI-10. User overexpectations come high up, though not as high as in France. Figures quoted by many respondents put the timescale for exceeding either one's expectations or the capacity of the machine at somewhere between one and two years after installation.

- All of these limitations suggest various tactics for the introduction of PC-RCS as an overflow mechanism tasking on and compensating for the deficiencies in the small system. Interestingly enough, communications does not feature as a high priority, though it is implied in the machine and standards incompatibility response.

- Examining the match between user and vendor perceptions of future requirements leads to the table in Exhibit VI-11. The correlation is very good at the top of the table, but this could be interpreted as being governed more by vendor understanding of current needs, since only word and text processing has dropped significantly between users' present use and their expected future use. However, there are in the second half of the table some new, up-and-coming PC uses, which have not yet registered as important in the vendor mind:

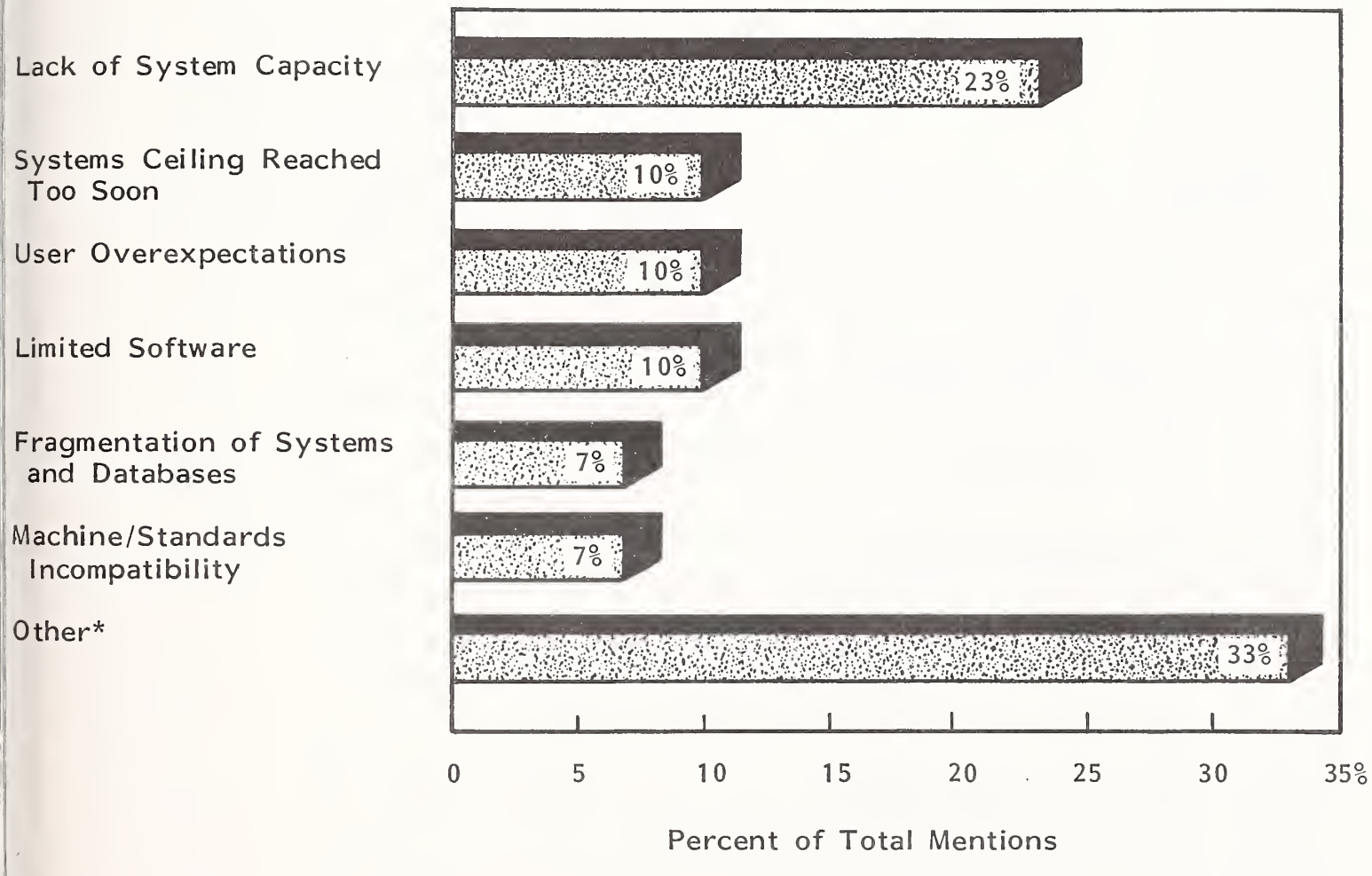
  - Database inquiry is a recently developed use of the PC in the U.S. and, with the U.K. being Europe's biggest market for on-line database services at over $100 million in 1982, the sophistication of the micro (for use as an expert system for complex information retrieval) will be applied first in this country.

  - Personnel records, local file handling, and marketing/sales applications are all departmental, cross-industry functions that have traditionally been less than well served by the average DP department.

  - Production systems, including BOMP and CAD/CAM, become of increasing interest to the departmental micro user as the technology (see

EXHIBIT VI-10

USER-PERCEIVED SHORTCOMINGS OF PCs
U.K.



*Includes: "Poor reliability; poor communications facilities; training costs."

EXHIBIT VI-11

USER PERCEPTIONS OF IMPORTANT
FUTURE PC-RCS APPLICATIONS
U.K.

USER RANKING AS FUTURE APPLI-CATION	APPLICATION AREA	VENDOR RANKING AS FUTURE APPLICATION	USER RATING AS EXISTING APPLICATION
1	Financial Planning and Spreadsheet Tasks	1	5.3
2	Industry-specific	2	2.5
3	Accounting, e.g., Consolidations, Job Costing	3	1.8
4	Database Inquiry	N/S*	N/S
5	Personnel/Human Resources	N/S	N/S
6	Production Systems/CAD/CAM	N/S	N/S
7	Local File Handling	N/S	N/S
8	Marketing/Sales	N/S	0.5
9	Word and Text Processing	N/S	2.2
	Other: Includes Payroll, Order Processing	includes nos. 4,5	

* N/S = Not Significant

Appendix C) brings performance improvements at the level of the supermicro. The other driving force in this area is the move towards the integration of CAD and CAM into complete computer-aided engineering (CAE) systems. This approach will involve networking of PCs and supermicros in increasing numbers.

3. IN CONCLUSION

- The U.K. is the most sophisticated market in Europe in use of PCs. It has now reached a stage where:

  - Large-scale users are getting interested in mounting more industry-specific business and technical systems on PCs in anticipation of technological advances in this area. RCS vendors will need to approach this segment with a full-service strategy and should expect to be implementing or assisting in the implementation of multimicro projects. Joint projects and joint ventures with systems companies and trade associations are to be sought out.

  - Medium-scale users are interested in both cross-industry and industry-specific solutions. Either the limited or the turnkey PC-RCS approach are valid in this area, but the vendor most be sure about which he is offering and how widely it is to be marketed.

  - Small-scale users are as much as anyone feeling the ceiling of what they can do with an individual PC. Professional marketing of cost-effective vertical market systems on a turnkey PC-RCS is the best approach to this segment:

    . The standalone PC is most often the prime component.

    . RCS is the winning element that can offer the future promise of integrated access to external databases and communications to

other companies. Lawyers are a good case in point here: text processing, precedent handling, and legal research are often served by an unintegrated set of standalone solutions.

- The small user vertical approach is typified by the situation in British agriculture where a rash of small systems has sprung up from within the industry and where the bureaucracy of the larger state-run organisations has militated against cost-effective marketing of central resources.

- The U.K. vendors should evaluate their relationship to British Telecom, which is positioning itself to take a standalone turnkey approach to the PC, but which will also be able to switch to supplying networking services as a higher level service at some future date.

D. WEST GERMANY

- The West German market has always been a difficult one for the RCS vendor. Due to the high costs of communications equipment and data transmission coupled with the tight monopoly practices maintained by the Bundespost, the market for RCS has never been able to blossom or to come up to its rightful size in the European league table.

- By contrast the West German computing services scene is dominated by the professional services sector, which is composed of a few large systems houses and a myriad of small and very small software firms, many operating in a purely local environment.

- Remember also that West Germany has for long been IBM's prime European market, taking some 28% of all IBM revenues earned in Western Europe. This IBM dominance has reinforced a strong in-house approach to data processing, and this has always acted against the establishment of strong outward-looking computing services groups.

- Nevertheless, some strong companies have grown up, tempered by this somewhat unusual environment, and they are living and growing sufficiently fast when judged by West German standards of performance.

  - Datev is one of the country's best known processing services organisations. It is an organisation of professional tax consultants and accountants who number almost 25,000 and are fee-paying associate members of the firm. Datev has a private network of 12,000 terminals using a variety of lines connected via Regnecentralen front-end processors to an IBM-compatible computer complex. The main operation is by remote data entry from the offices of the local associate members into the central machines for processing of payroll, accounts, and tax returns. Output is principally by mailing of results directly to customers. Some interactive use of the network is made by members wanting to interrogate Datev's database of tax law and tax regulations (calld LEXINFORM). Datev is an obvious candidate for investing in more intelligent terminals at associate member offices, and PCs should be under consideration here. At the present time it does not contribute to West German PC-RCS.

I. USER ATTITUDES

- Price and cost-effectiveness were reported by respondents to be the most important influence in the selection of a PC. They were followed by:

  - Aptitude for a particular requirement.

  - Speed of access to results.

- Lesser reasons mentioned include:

  - User has control over his own machine.

- Ease of use of a PC.

- It does the sort of task you wouldn't want to mount on an external service.

- Most processing services customers in West Germany are smaller firms whose work is undertaken in a traditional batch processing mode. These customers are constantly being lost to the vendors as they install their own in-house systems, which most recently have been of the PC category. The move to purchase of a PC has been accelerating since the IBM PC was launched in the autumn of 1982. There are now over 80,000 PC-based business systems, most operating standalone.

- Customers still using batch processing services are sending locally prepared data on diskettes to their chosen supplier for him to process and then to dispatch the results by mail. In this way small users obviate the need for high communications costs, and the vendor has the satisfaction of having exported some of his labour costs.

- When evaluating alternative solutions, users reported that PCs were never in contention with RCS.

- Sixty percent of users made a formal evaluation, but none claimed that it was a quantified affair. One user commented that, "Since the PC is amortised over one or at worst perhaps two years, it is an obvious choice." Only one respondent claimed an actual reduction in RCS expenditure after getting his PC.

- Evaluation of PC communications capabilities is now in progress in many DP departments. However, the principal networking mode is almost exclusively via the central mainframe in traditional ways.

- Trade fairs were mentioned by 70% of the sample as an important source of information on PCs. Colleagues and associates, as shown in Exhibit VI-12, had an unusually large part to play in this process.

- The overall satisfaction rating for PCs was higher than that given in either the U.K. or France.

2. OPPORTUNITIES

- Because of the gulf between the RCS and the PC market segments, the West German situation requires a different strategic approach to that adoptable elsewhere.

- With the majority of the PC interest being on the part of batch bureau customers, it is the standard batch company that should be addressing itself to this market. A low-level strategy is in order. Both the standalone software product strategy and an approach via retailing of standalone hardware are valid.

- There is also a high incentive for the true RCS vendors to adopt a full-service strategy and to target the larger user with ancillary services and products as much as with mainstream RCS.

- The advent of the Bildschirmtext (BTX), public videotex service, and the anticipated increase in use of the X.25 public data network should both help to reduce communications costs. Vendors are recommended to adopt temporary holding strategies until the buoyancy of the market can be better gauged.

- Exhibit VI-13 illustrates the preoccupation of users with the limitations of PC software. This is partly a fact and partly the result of poor marketing of PC software by the PC software products companies. In either case it shows where the added value for vendors will lie.

EXHIBIT VI-12

IMPORTANCE OF INFORMATION SOURCES
IN CHOOSING PC HARDWARE AND SOFTWARE
WEST GERMANY

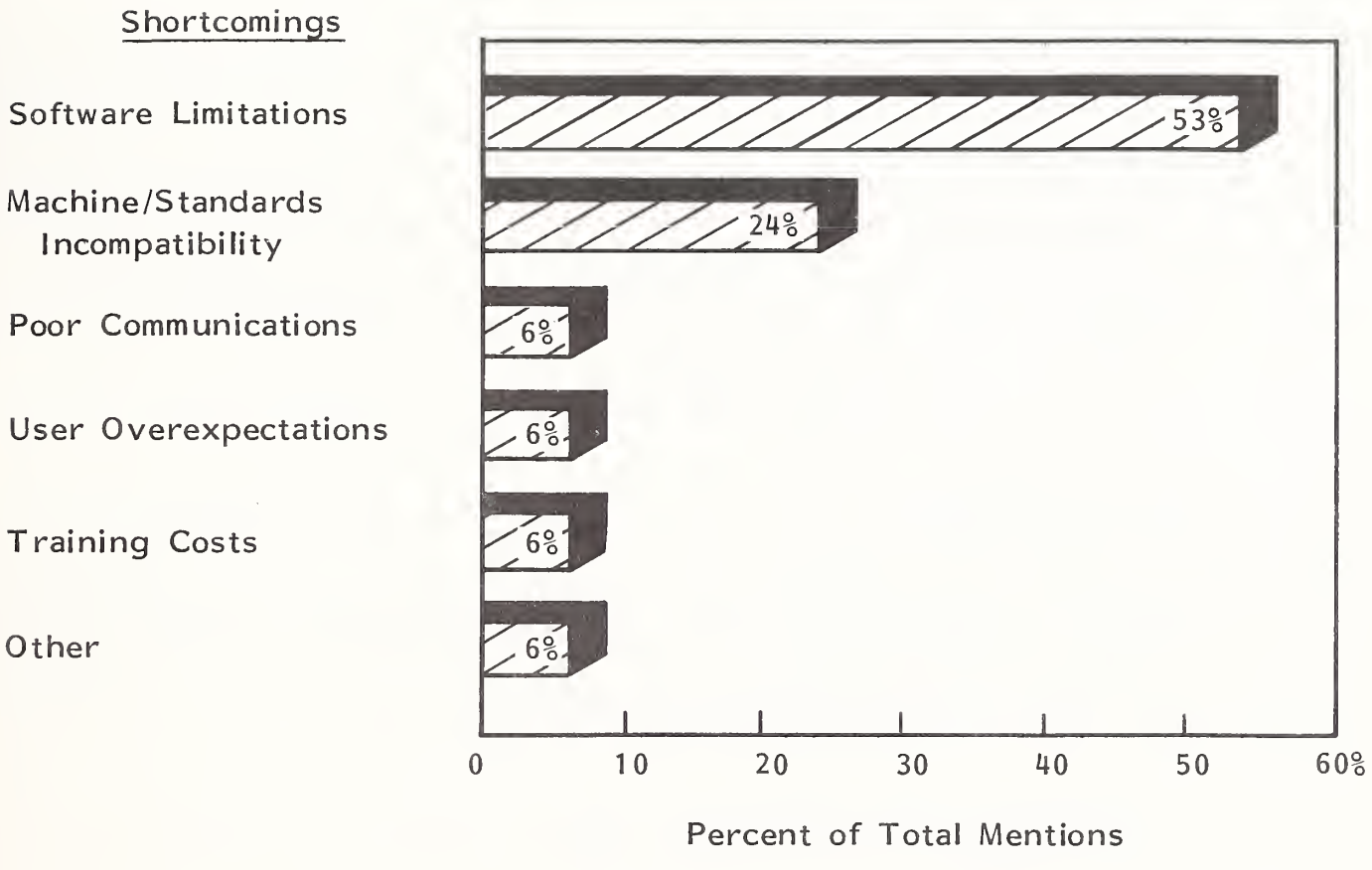
SOURCE OF INFORMATION	AVERAGE IMPORTANCE RATING ON SCALE OF 1 TO 5*
1. Colleagues and Associates	3.8
2. Management Services Department	3.5
3. Trade Publications	2.8
4. Manufacturers	2.0
5. Computer Stores/Dealers	1.6
Others: Includes Trade Fairs	3.5

* 1 = Low, 5 = High

Overall reported degree of satisfaction with PCs on a scale of 1 to 5 = 4.2

EXHIBIT VI-13

USER-PERCEIVED
SHORTCOMINGS OF PCs
WEST GERMANY



- The problem of incompatibility of standards is again peculiar to West Germany. It stems from the need to be able to read data on as many types of diskette as possible, a difficult feat in the absence of standards for floppy drives - and also an added reason for including hardware as an element of a PC strategy. Hardware sales will give more control of the diskette population if only well-known and well-supported brands are marketed by computer services vendors.

- Exhibit VI-14 lists five important future application areas for users and their PCs. There is some evidence that financial planning and spreadsheet systems are falling off in importance to users and are being overtaken by other areas. Vendors are targeting their future PC products more actively at industry-specific areas, and the users have not yet shown themselves ready for that approach. Order processing/stock control remains a reasonably active area and one which vendors are also addressing.

3. IN CONCLUSION

- West Germany is the country with the most PCs and business micros in Western Europe. Because of its underdeveloped RCS market, present-day flirtations with the PC are an activity of the batch bureaux.

- IBM has acted as a market catalyst with the introduction of its PC.

- Because of the likely future developments in communications and the difficulty of predicting their impact on the market, vendors are recommended to:

  - Adopt a temporary but flexible strategy towards PC services.

  - Move quickly to put software and service added value to hardware PC sales.

EXHIBIT VI-14

USER PERCEPTIONS OF IMPORTANT
FUTURE PC-RCS APPLICATIONS
WEST GERMANY

USER RANKING AS FUTURE APPLI-CATION	APPLICATION AREA	VENDOR RANKING AS FUTURE APPLICATION	USER RATING AS EXISTING APPLICATION
1	Word and Text Processing	N/S*	1.1
2	Order Processing/Stock Control	2	0.8
3	Management Reporting	N/S	0.5
4	Production Systems	4	0.5
5	Financial Planning and Spreadsheet	3	1.3
	Other: Includes Accounting, Data-base Inquiry, Marketing/ Sales, Local File Manage-ment, Scientific Calculations, Communications.	includes the no. 1	

* N/S = Not Significant

- Develop an opportunistic approach to the large company sector in the hope of picking up interesting major projects with a professional services content.

- Examine third-party maintenance (TPM) opportunities on a regional basis.

- Develop joint ventures with software suppliers, computer dealers, office equipment suppliers and vertical market trade associations.

E. ITALY

- Italy has recently been making great efforts to improve the country's telecommunications facilities, but owing to years of neglect, this is going to take a long time. One result of this past neglect is that Italy does not have a strong RCS industry, though there are useful revenues earned by some companies, notably:

  - IBM RCS division.

  - GEISCO.

  - GE-DA.

  - Data Management.

  - ADP Network Information Services.

- The majority of processing services activity in Italy has traditionally been batch oriented, supported by large off-line data preparation operations. This is slowly changing now as more private network facilities are installed in large

organisations and as the spread of small business systems based on minicomputers increases the proportion of data input via terminals.

- Over the last three years there has been remarkable growth in the computer service companies' activities in the turnkey business system sector. SICIT, for example, turned over an estimated 10 billion lire in integrated systems in 1982.

- With the arrival of the microcomputer in 1979 many of the smaller software companies began to implement turnkey systems on the new machines. Because of the fragmented nature of the Italian services industry (over 1,000 companies are estimated to be active), many of these companies have only implemented a few systems each. Nevertheless, there is considerable activity both on the part of software houses and on the part of processing companies.

- Distribution channels for micros and PCs are still in a state of turmoil in Italy, but Olivetti has started to set its stamp on the marketplace and is expected to obtain a lead position that is unassailable. If it does, this will be the first case of an indigenous European supplier holding a significant market share in the business micro sector, hitherto the undisputed province of U.S. companies.

- The development of PC-RCS services is at an early stage but is expected to develop at a brisk pace in the next three years. By mid-1985 the Italian market for PC-RCS will be worth over 16 billion lire.

- INPUT's strategy recommendation for RCS vendors is two-pronged:

  - Establish a presence in the mass software products market in order to maintain software development capability in-house.

  - Target the larger groups with communications and database services based on PCs.

- Prospect for joint ventures with reputable partners to complement one's own skills and to build towards an eventual full-service strategy for PCs.

APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

A. PERSONAL COMPUTER (PC)

- INPUT defines the personal computer as a machine programmable by the user selling for $500 to $15,000. The minimum unit contains at least 16K of main memory, a keyboard, and a CRT. This definition, based on price rather than technical characteristics, focuses on the business market that is the subject of this study.

B. SERVICE MODES

- PROCESSING SERVICES - Remote computing services, batch services, and processing facilities management.

  - REMOTE COMPUTING SERVICES (RCS) - Provision of data processing to a user by means of terminals at users' sites connected by a data communications network to vendors' central computers. There are five submodes of RCS:

    . INTERACTIVE (timesharing) - Characterized by the interaction of the user with the system, primarily for problem-solving time-sharing but also for data entry and transaction processing: the user is on-line to the program/files.

- REMOTE BATCH - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements.

- DATABASE - Characterized by the retrieval and processing of information from a vendor-maintained database. The database may be owned by the vendor or a third party.

- USER SITE HARDWARE SERVICES (USHS) - These offerings provided by RCS vendors place programmable hardware on the user's site (rather than in the information systems center). Many types of PC-RCS offerings are included here. USHS offers:

  - Access to a communications network.

  - Access through the network to RCS vendors' large computers.

  - Significant software as part of the service.

- BATCH SERVICES - This includes data processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- PROCESSING FACILITIES MANAGEMENT (PFM) (also referred to as Resource Management or Systems Management) - The management of

all or part of a user's data processing functions under a long-term contract (not less than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

- PROFESSIONAL SERVICES - Made up of services in the following categories:

  - EDUCATION SERVICES - IS products and/or services - related to corporations, not individuals.

  - CONSULTING SERVICES - IS management consulting and feasibility studies, for example.

  - PROGRAMMING AND ANALYSIS - Including system design, contract programming, and "body shopping."

  - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - The counterpart to processing facilities management, except that in this case the computers are owned by the client, not the vendor; the vendor provides people to operate and manage the client facility.

- INTEGRATED SYSTEMS (also known as turnkey systems) - An integration of systems and applications software with computer hardware, packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are integrated systems. Integrated systems do not include specialized hardware systems such as word processors, cash registers, and process control systems.

- Integrated systems expenditures are divided into several categories:

  - INDUSTRY-SPECIFIC systems serve a specific function for individual industry sectors such as seismic processing systems, automobile dealer

parts inventory, CAD/CAM systems, and discrete manufacturing control systems.

- CROSS-INDUSTRY systems provide a specific function applicable to a wide range of industry sectors such as financial planning systems, payroll systems, personnel management systems, etc.

- CUSTOM systems are developed by a vendor specifically for a single customer.

- Expenditures include hardware, software, and support functions.

- SOFTWARE PRODUCTS - This category includes users' purchases of applications and systems packages for use on in-house computer systems. Included are lease and purchase expenditures as well as fees for work performed by the vendor to implement and maintain the package at users' sites. Fees for work performed by organizations other than the package vendor are counted in professional services. There are several subcategories of software products:

  - APPLICATIONS PRODUCTS - Software that performs processing to service user functions. They consist of:

    - CROSS-INDUSTRY PRODUCTS - Used in multiple-user industry sectors. Examples are payroll, inventory control, and financial planning.

    - INDUSTRY-SPECIALIZED PRODUCTS - Used in specific industry sectors such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting and airline scheduling.

  - SYSTEMS PRODUCTS - Software that enables the computer/communications systems to perform basic functions. They consist of:

- SYSTEMS CONTROL PRODUCTS - Function during applications program execution to manage the computer system resource. Examples include operating systems, communication monitors, emulators, and spoolers.

- DATA CENTER MANAGEMENT PRODUCTS - Used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.

- APPLICATION DEVELOPMENT PRODUCTS - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, database management systems, report writers, project control systems, and retrieval systems.

C. TYPES OF PROCESSING SERVICES

- Processing services encompass processing services facilities management, remote computing services, and batch services. They are categorized by types of services bought by users as follows:

  - CROSS-INDUSTRY services are the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, where the vendor supplies the database and controls access to it (although it may be owned by a third party), are

included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. When the application, tool, or database is designed for specific industry use, however, the service is industry specific.

- INDUSTRY-SPECIFIC services provide processing for particular functions or problems unique to an industry or industry group. The software is provided by the vendor either as a complete package or as an applications tool that the user employs to produce a unique solution. Specialty applications can be either business or scientific. Industry-specific database services, where the vendor supplies the database and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specific applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

- UTILITY services are those where the vendor provides access to a computer and/or communications network with basic software that enables any user to develop his own problem solution or processing system. These basic tools include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

D. OTHER CONSIDERATIONS

- When questioning where to count certain user expenditures, INPUT takes the user viewpoint and categorizes them by asking, "What do the users perceive they are buying?"

APPENDIX B: INTERVIEW PROFILE

APPENDIX B: INTERVIEW PROFILE

A. USER PROFILE

- INPUT specifically aimed the bulk of the interviews at RCS users in predominantly large corporations that:
  - Use (or were using) significant amounts of RCS.
  - Have displaced some or all of their RCS use with PCs.
- The composition of the sample of RCS users responding to the survey is depicted by industry in Exhibit B-1 and by country and size in Exhibits B-2, B-3, B-4 and B-5. These exhibits also details the job function, department affiliation, and job level of the individual respondents. Exhibit B-6 is the equivalent for the whole European sample.
- As can be seen, more than half the companies surveyed are large and represent diverse industries. The responses came from a variety of departments of which the respondent was usually the head.
- As shown in Exhibit B-7 only 8 of the 81 users are not now using PCs. Of the 73 PC users, 9 are using PCs in conjunction with RCS services.

EXHIBIT B-1

DISTRIBUTION OF USER RESPONDENTS BY INDUSTRY
ALL EUROPE

Total Respondents: 81

EXHIBIT B-2

COMPOSITION OF USER SAMPLE
FRANCE

A. Distribution by size of company (no. of staff).

1,000 and over	80%
100 - 1,000	20
under 100	0
Total	100%

B. Job function of respondents.

Information Systems	72%
Operations	20
Research/Engineering	-
Planning/Administration	-
Accounting/Finance	8
Marketing/Sales	-
Total	100%

C. Responsibility level of respondents.

Department head, director, manager	60%
Planner, analyst, scientist	40
Total	100%

D. The average number of people in respondents' departments is 113.

EXHIBIT B-3

COMPOSITION OF USER SAMPLE
U.K.

A. Distribution by size of company (no. of staff).

1,000 and over	68%
100 - 1,000	24
under 100	8
Total	100%

B. Job function of respondents.

Information Systems	24%
Operations	16
Research/Engineering	-
Planning/Administration	4
Accounting/Finance	56
Marketing/Sales	-
Total	100%

C. Responsibility level of respondents.

Department head, director, manager	68%
Planner, analyst, scientist	32
Total	100%

D. The average number of people in respondents' departments is 41.

EXHIBIT B-4

COMPOSITION OF USER SAMPLE
WEST GERMANY

A. Distribution by size of company (no. of staff).

1,000 and over	54%
100 - 1,000	23
under 100	23
Total	100%

B. Job function of respondents.

Information Systems	54%
Operations	38
Research/Engineering	-
Planning/Administration	-
Accounting/Finance	8
Marketing/Sales	-
Total	100%

C. Responsibility level of respondents.

Department head, director, manager	85%
Planner, analyst, scientist	15
Total	100%

D. The average number of people in respondents' departments is 18.

EXHIBIT B-5

COMPOSITION OF USER SAMPLE
ITALY

A. Distribution by size of company (no. of staff).

1,000 and over	6%
100 - 1,000	44
under 100	50
Total	100%

B. Job function of respondents.

Information Systems	100%
Operations	-
Research/Engineering	-
Planning/Administration	-
Accounting/Finance	-
Marketing/Sales	-
Total	100%

C. Responsibility level of respondents.

Department head, director, manager	100%
Planner, analyst, scientist	-
Total	100%

D. The average number of people in respondents' departments is 12.

EXHIBIT B-6

COMPOSITION OF USER SAMPLE
EUROPE

A. Distribution by size of company (no. of staff).

1,000 and over	56%
100 - 1,000	27
under 100	17
Total	100%

B. Job function of respondents.

Information Systems	63%
Operations	11
Research/Engineering	-
Planning/Administration	17
Accounting/Finance	9
Marketing/Sales	-
Total	100%

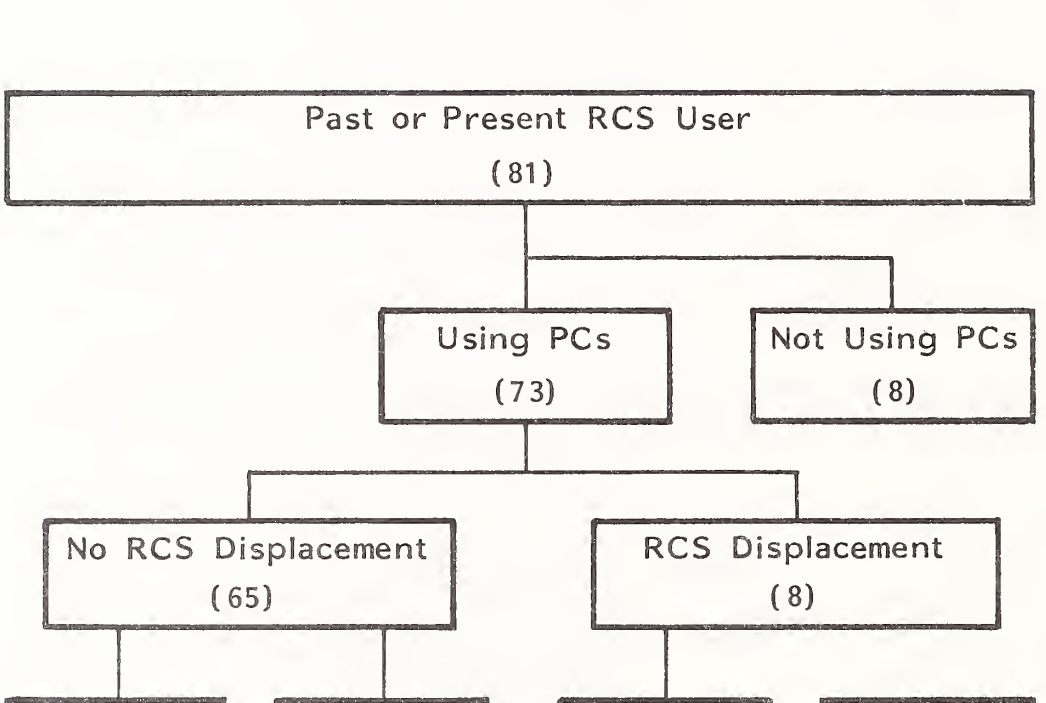
C. Responsibility level of respondents.

Department head, director, manager	78%
Planner, analyst, scientist	22
Total	100%

D. The average number of people in respondents' departments is 51.

EXHIBIT B-7

USER PROFILE BY PC-RCS USE



B. VENDOR PROFILE

- Thirty-six RCS vendors were interviewed having an average of $18 million annual domestic computer services revenue, ranging from a low of $1.3 million to a high of $175 million. In 40% of the cases RCS was the major revenue component.

- The sample represented 9% of Western Europe's 1982 RCS revenues.

- Vendors known to be active and aggressive in promoting PC-based RCS services were selected for interviews in order to profile aspects of the "leading edge" of this new service.

APPENDIX C: TECHNOLOGY ANALYSIS

APPENDIX C: TECHNOLOGY ANALYSIS

A. OVERVIEW

- Personal "computing" really started with timesharing in the 1960s. However, the personal "computer" started life in the mid-1970s as a bagful of parts that hobbyists assembled; data were input by toggle switches. In 1978 all of this changed, in large part because of the introduction of the Apple.

- The choices now available are mind boggling:

  - There are dozens of PC manufacturers offering over a hundred models. There are many hundreds, if not thousands, of hardware peripherals and other add-ons to choose from. New products (and companies) are announced every day.

  - There are at least 5,000 software packages (excluding games) for PCs and probably almost as many software firms, most of which are obviously very small. The next few years should see a tidal wave of PC software.

- Four principles should be kept in mind when examining the PC marketplace:

  - Technical innovation will continue to flourish. The statement "Next year's products will be better than this year's products" will be true for

some time to come. This is not a reason to avoid action but is useful to know when assessing exciting, but untested, products.

- Hardware is much more advanced than software and will remain so for some time. Hardware and software are both more sophisticated than many PC users; however, users will soon begin to close the gap.

- Hardware prices will fall in real terms and especially in terms of capabilities per dollar. Future software package price movements are much less clear.

- Many vendors (hardware as well as software) will not survive in the PC marketplace. Some will fall by the wayside because of inferior products; others, though, will simply not be able to gain enough market share to maintain a viable operation.

B. CURRENT PERSONAL COMPUTER SYSTEM OFFERINGS

- Because the PC market is new and quickly expanding, there is considerable confusion among both buyers and sellers as to what its boundaries are. Part of the confusion is caused by the tendency to use the terms "personal computer" and "microcomputer" interchangeably. Furthermore, the term microcomputer can be applied to hardware systems priced from $300 to $30,000.

- Exhibit C-1 shows the range of microcomputer systems categorized in four levels:

  - Level I contains the machines that have been mass marketed. The manufacturers hope that they will be upgraded by adding floppy disks, etc. However, in their present form most of these low-priced machines are not suitable for business use; the Commodore business models are the only partial exception.

EXHIBIT C-1

LEVELS OF MICROCOMPUTER SYSTEMS

CATEGORY	COMPONENTS	PRICE RANGE	EXAMPLES
Level 1 Home Systems	8-Bit CPU, Minimal Memory, Optional Monitor	$50-1,500	TI99, Commodore (Low End), Tandy (Low End)
Level 2 "Core" PC	8-Bit or 16-Bit CPU, Floppy Disks, Monitor, Optional Dot-Matrix Printer	$1,500-5,000	Apple II, IBM PC, TRS-80, Xerox 820, Commodore (High End)
Level 3 Large PC/Small Business Systems	16-Bit CPU, Hard Disk, Floppy Disk, Monitor, Letter Quality Printer	$5,000-20,000	Apple III, IBM XT, Altos, Alpha-Micro, TRS-80 Model 16
Level 4 "Super-micro"	16- or 32-Bit High Performance CPU, Monitor, Hard Disk, Tape Backup	$20,000-30,000	Three Rivers, Charles River, Apollo

- Level 2 equipment is the true PC. These machines account for most current installations and perform credibly.

- Level 3 is a group in transition. Relatively inexpensive hard disks have now been introduced as add-ons to Level 2 machines or as the basis for higher performance systems in the $5,000-7,000 category.

  . The fate of the traditionally more expensive small business systems (Altos, Alpha-Micro, etc.) remains to be seen.

  . It is just a matter of time, in INPUT's opinion, before the Level 2 users move up to the higher performance of the low-end Level 3 systems.

- Level 4 systems target scientists and engineers, who need intensive processing, and system integrators, who need a powerful centerpiece for their systems.

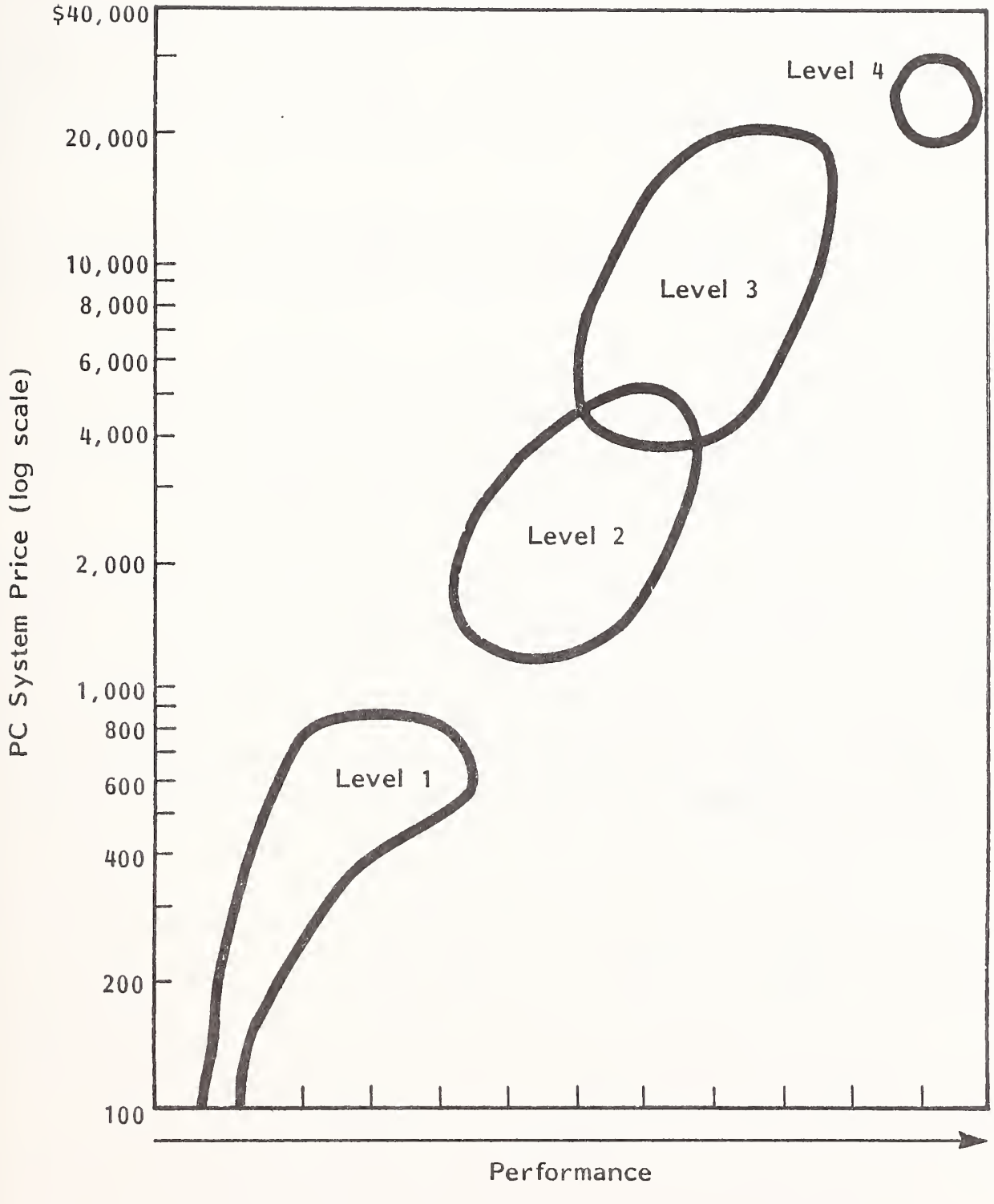
- The general relationships between price and performance of different level systems is shown in Exhibit C-2.

  - Level 1 is isolated from Level 2.

  - Level 4 represents a discontinuity between price and performance.

EXHIBIT C-2

RELATIONSHIP BETWEEN DIFFERENT LEVELS OF MICROCOMPUTER SYSTEMS: 1983



C. HARDWARE

1. PROCESSORS

- First generation PCs were 8-bit machines. The IBM PC set the pace for using 16-bit chips. In 1983 most of the machines aimed at the business market will be 16-bit machines.

  - Currently, the 16-bit machines' advantage over 8-bit machines is not too evident in practice since most software was designed for 8-bit machines.

  - Sixteen-bit machines have been forced either to have spare 8-bit chips for the old software or to emulate the older machines. In either case, the true value of the newer technology has not been realized.

  - On the horizon are 32-bit machines (e.g., the Charles River Universe 68) that will be impressive performers indeed.

- Straight processing chips are not really a limiting factor any more. At second-tier computer shows, for example, Z80A chips (a mainstay of 8-bit PCs) can be purchased at a display booth for $3.50 each (you must buy at least eight, though).

- Special purpose chips (e.g., operating systems, VisiCalc, graphics fonts) will begin to be built into PCs or offered as add-ons.

  - This will be partly a marketing ploy and partly a means to protect software from being copied.

  - Functional chips will greatly improve performance as well as free the main memory.

2. PERIPHERALS

- Until recently, PCs were limited in their data storage capability - several hundred K of floppy disk storage. Now many PCs offer hard disk options.

  - Typically, sizes range from 4- to 12-megabyte Winchester disks with prices in the $3,000 to $7,000 range.

  - A few manufacturers are beginning to offer Winchester disks in the 20- to 32-megabyte range, starting at $6,000 (e.g., Fortune).

  - Vendors are predicting 100-megabyte disks soon at one end of the scale and super small 3-inch Winchesters at the other.

  - Vertically recorded floppies, with storage in the megabyte range, may be offered soon.

- Winchester technology is far preferable to floppy disks in the office environment, not only because of storage capacity, but also because there are potentially many fewer mechanical problems.

  - Floppies are exposed to handling and other destructive forces because of their design. The floppy disk transport mechanism is similarly exposed to mishandling, dirt, and other contaminants.

  - Floppies are still an order of magnitude cheaper, though, and for many applications, floppy technology is quite adequate.

  - While Winchester disks are far more secure because of their sealed design, there are two problems:

- There is often no backup when problems do occur. Several hundred floppies might be needed to back up one Winchester. Streamer tapes and removable disks are obvious answers but significantly add to PC investment. More important, many PC users have not learned the need for backup.

- Another, potentially more serious, problem is that the long-term reliability of some vendors' mini-Winchesters is not known. Certain manufacturers have cast aspersions on the quality of the design and manufacturing of some of their competitors. Buyers would be well advised to thoroughly check the track record of all peripherals they acquire, especially disks.

3. PERSONAL COMPUTERS AS WORKSTATIONS

- Most PCs can function as terminals after the addition of a modem and communications software (cost: $200 to $1,000 depending on sophistication). However, the PC usually loses most of its intelligence and local processing capabilities in doing so.

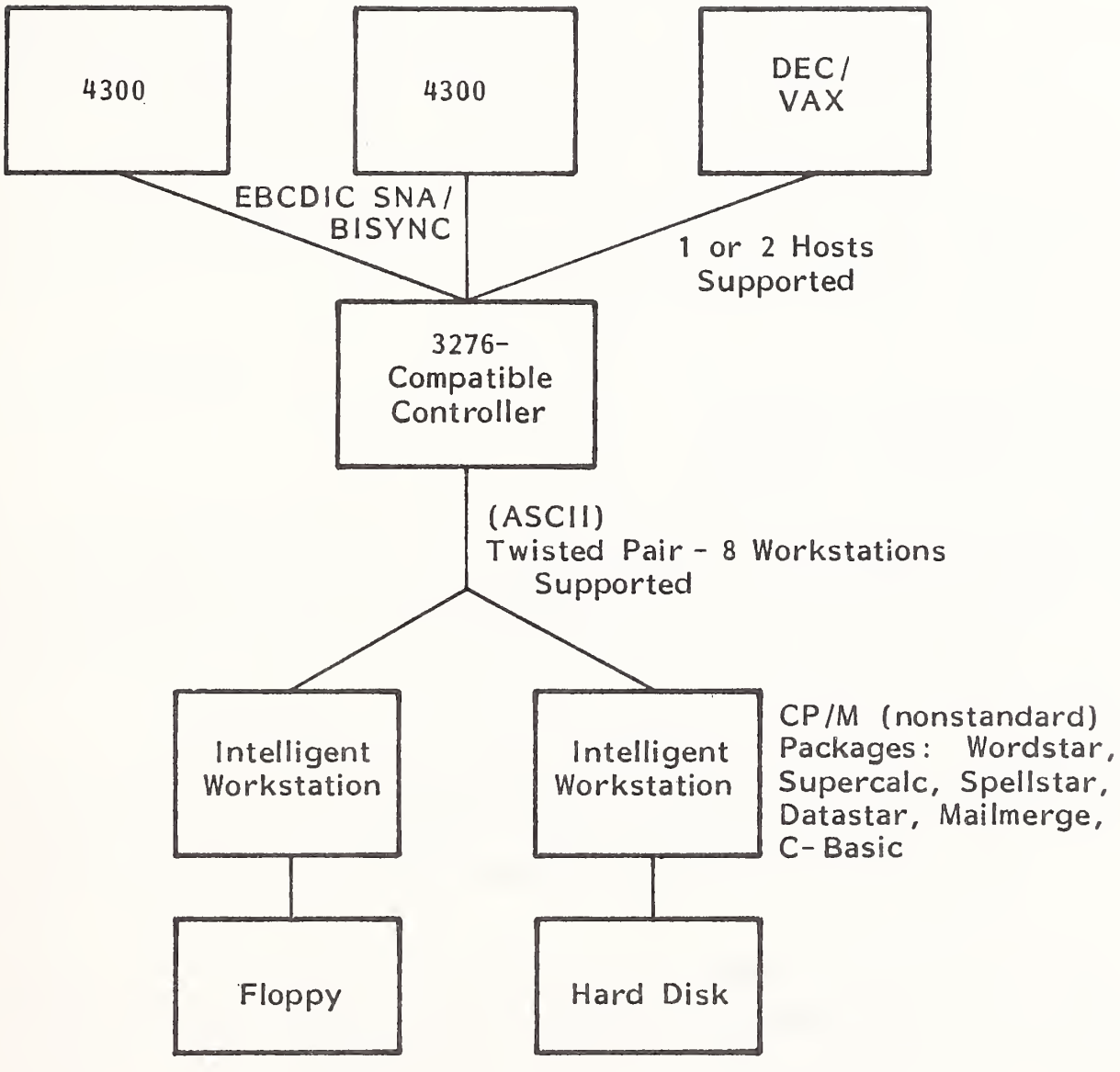
- At least one vendor (Beehive International) has recently announced a true dual-purpose workstation that combines a CP/M PC with 3270-compatible terminals, as shown in the system schematic in Exhibit C-3.

  - The concept is quite interesting and would be useful for applications where a department regularly inputs data into a central system and/or has legitimate local processing needs.

  - Data can be staged, either upwards or downwards, in local disk storage. Packaged software supplied with the system can manipulate data before or after central processing.

EXHIBIT C-3

DUAL-PURPOSE WORKSTATION (BEEHIVE'S "TOPPER")



- A limitation of the system is that it supports a proprietary variant of CP/M so that externally acquired CP/M programs may or may not work. This is a serious deficiency, although the vendor may be able to translate the programs.

- Another problem is that a considerable amount of time may be required to put the system in place (for both hardware and software). The user will find that this limits the sought-after PC flexibility.

- Similar implementations are sure to be announced soon, offering prospective users a different range of capabilities.

D. RESOURCE SHARING

- In the medium term most communications will probably be from PC to PC. Most such communications will take place on the same site and a majority within the same department.

- This kind of local communication is not so much to send messages or exchange data as it is to share data. It is no coincidence that two of the major PC local area network vendors are also mini-Winchester vendors (Corvus and Nestar).

  - These vendors know that one of the biggest barriers to selling hard disks is their cost, which is probably more than the rest of a standalone PC system. Sharing disks means sharing costs.

  - There are also good systems reasons for different users in the same department to share data. The rationale is basically the same as for a DBMS in mainframe systems.

- Sharing resources can be accomplished on different levels by having:

  - A single processor that allocates resources (IBM 360 architecture).

  - Multiple processors that go through a single controller.

  - Multiple processors and controllers (i.e., a local area network).

- These different approaches are shown schematically in Exhibit C-4. The second and third alternatives are those most suitable for the PC world.

E. SOFTWARE

- PC operating systems are very different from mainframe operating systems in one important nontechnical respect: with two exceptions, operating systems are not proprietary to an individual manufacturer.

  - Admittedly, the exceptions (Apple and Tandy) are major ones. However, when the IBM-PC entered the market with a choice of three operating systems (CP/M-86, MS-DOS, and UCSD p-System), it put the stamp of approval on "open systems."

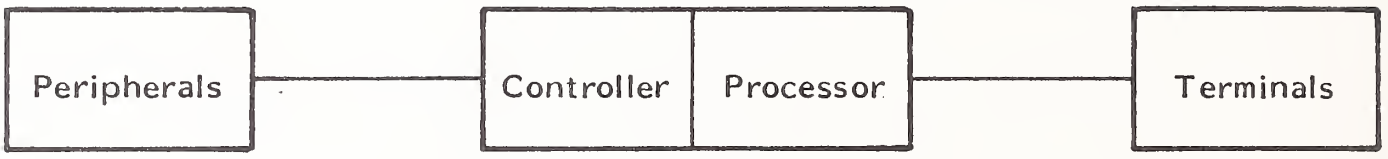
  - This means that PC choice and compatibility (or incompatibility) exist on many levels. This is unlike the mainframe world where the initial choice of a particular manufacturer by a user makes (or forecloses) many other decisions.

- Exhibit C-5 shows how the PC decisions run from the chip level to applications packages.

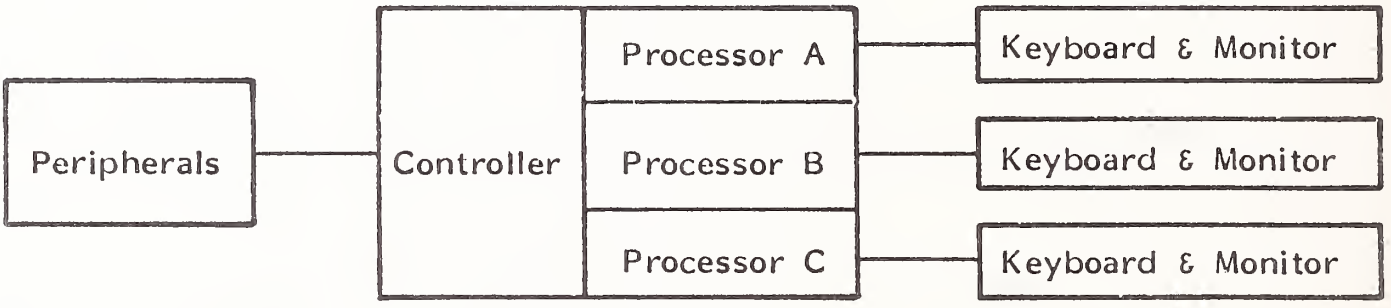
EXHIBIT C-4

SHARED PERIPHERAL ALTERNATIVES

Time-Sliced CPU (360 Architecture)



Dedicated CPUs (Modular Computer)



Bus/Ring (Nestar, Corvus)

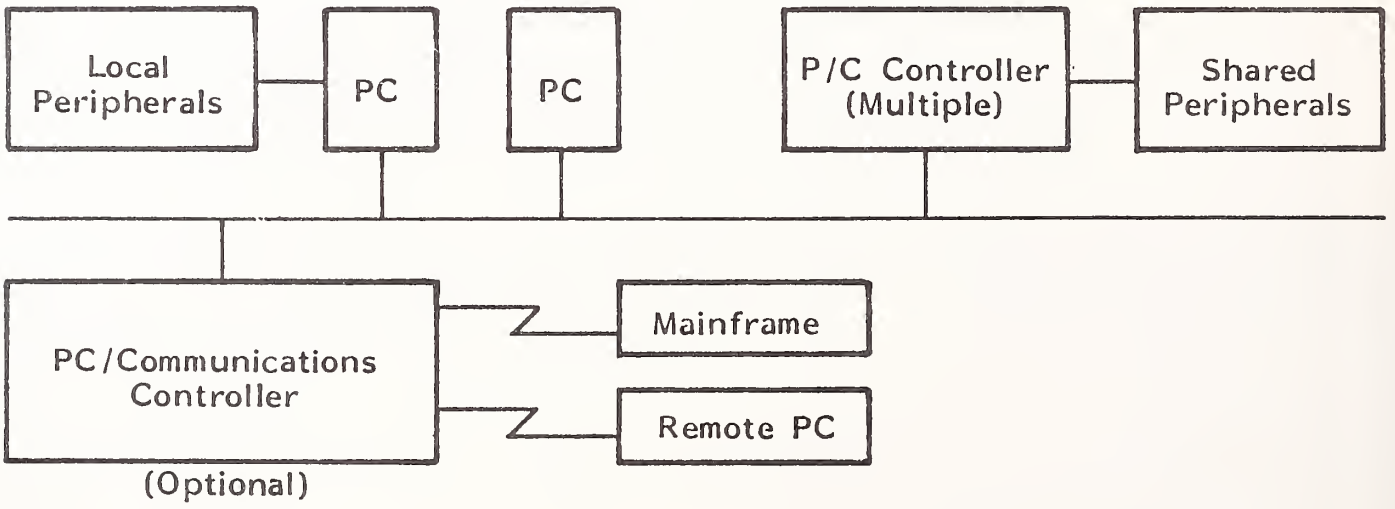
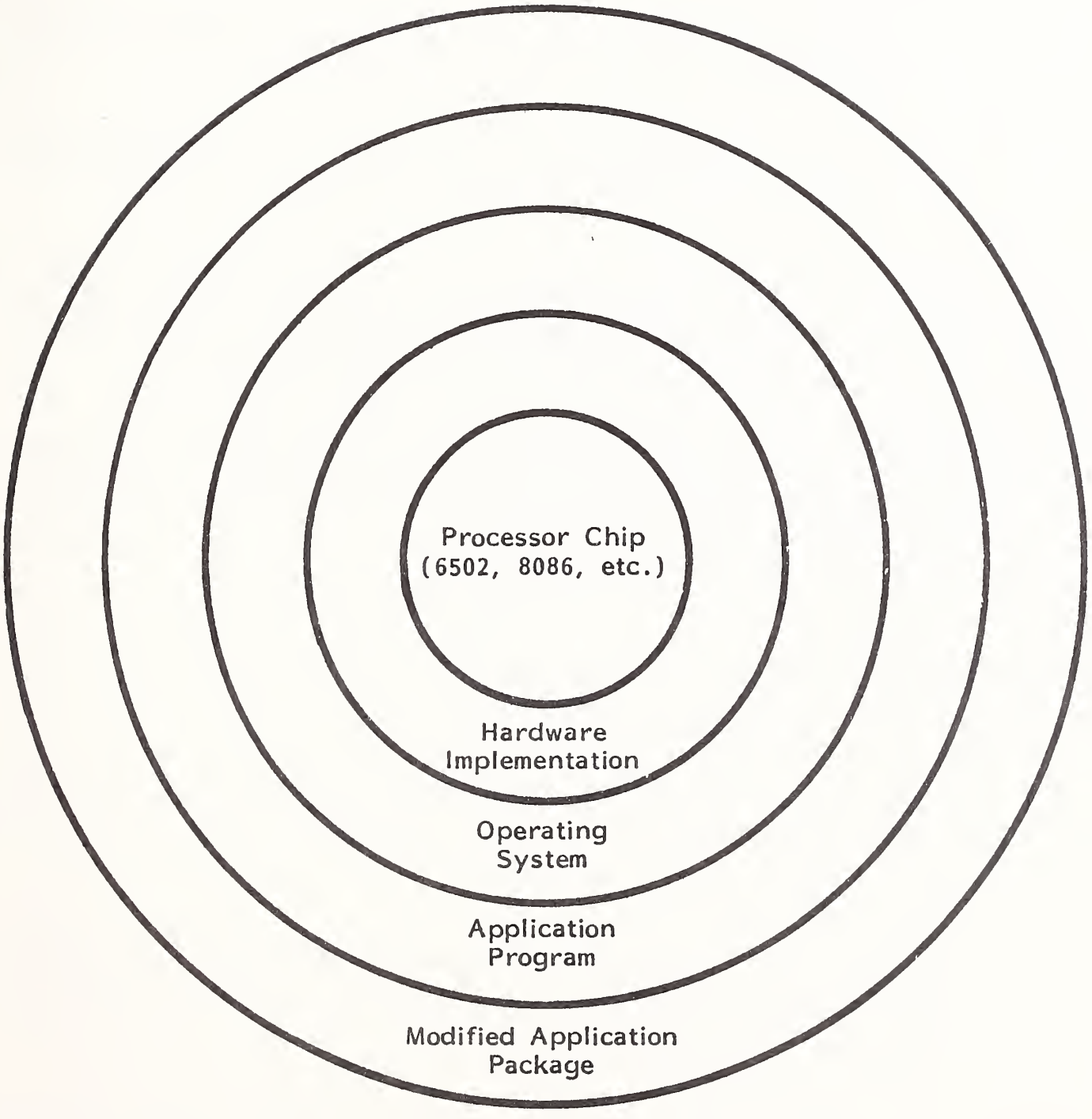


EXHIBIT C-5

LEVELS OF PERSONAL COMPUTER COMPATIBILITY



- The same processor chip may be used differently by different manufacturers, e.g., for peripheral interfaces. See examples for 16-bit machines in Exhibit C-6.

- Standard operating systems (e.g., CP/M) will not necessarily perform the same way on different hardware implementations.

- Applications programs are, of course, operating-system dependent, but they may also be hardware manufacturer dependent.

- In addition, popular applications packages such as VisiCalc are often modified, by either third-party vendors or end users, for special purposes (e.g., real estate planning, construction bidding).

- These complexities mean that most applications packages have to be tailored or "tweaked" to run on different manufacturers' hardware, even where the same operating system is involved.

F. TRENDS

- Through the mid-1980s the PC market will be characterized by rapid pricing declines for a given level of performance combined with generally increased levels of performance.

- Redrawing the price-performance relationships of the four levels of PCs (shown for 1983 in Exhibit C-2) produces a different set of "footprints" for 1985, as shown in Exhibit C-7.

  - Each footprint is somewhat smaller in the lower three classes as products become more standardized (i.e., virtually commodities).

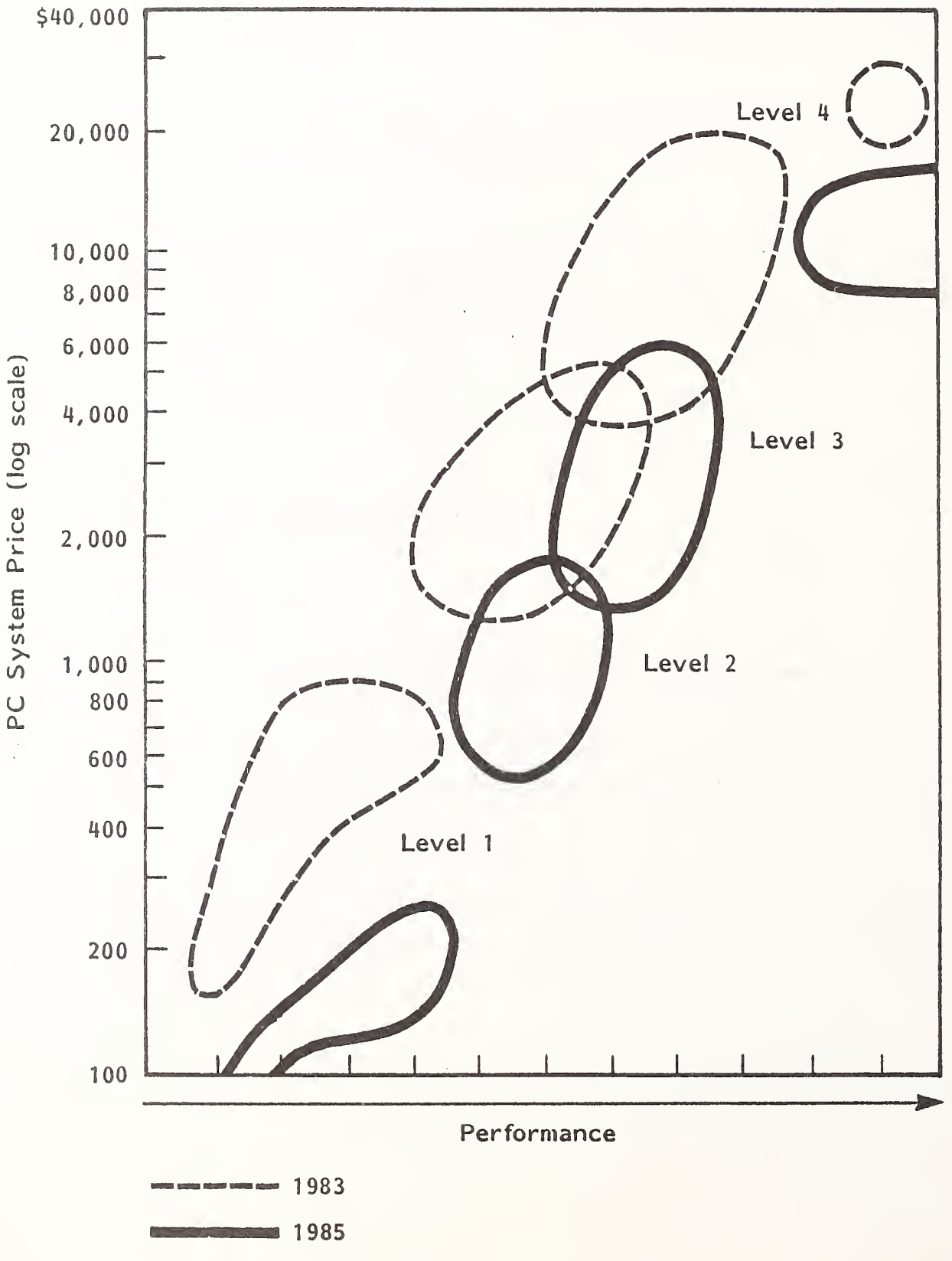
EXHIBIT C-6

CHIPS FOR 16-BIT SYSTEMS
(Examples)

CHIP TYPE:	8088	8086	68000
Vendors	Commodore BX256 DEC IBM PC North Star 8116 Vector Graphic 4 Victor	Eagle GRID NEC Wang Professional	Corvus Fortune TRS80 - Model 16 Lisa

EXHIBIT C-7

RELATIONSHIP BETWEEN DIFFERENT LEVELS OF MICROCOMPUTER SYSTEMS: 1985



- Performance shifts to the right for all levels, and prices come down.

- The relative change in Level 4 will in some ways be the most impressive: these systems will break the $10,000 mark and offer performance characteristics now associated with mid-range minis (e.g., one MIP and up throughput).

- These Level 4 systems are currently solutions looking for problems. They are already beginning to find acceptance in the scientific and research communities and many turnkey companies are looking at these systems with great interest. Special-purpose systems can be packaged in these units at extremely attractive price-performance levels.

- The results of the collaboration between the super-micro makers and turnkey vendors should be apparent by 1984 and could have the following impacts:

  - Extraordinary amounts of processing power would be offered directly to end users.

  - The traditional minicomputer would no longer have a rationale.

  - Smaller mainframes (up to the middle of the existing 4300 line) would be overlapped.

  - These supermicros could form the core of very cheap timesharing systems that could be rented to end users.

- A specialized use of the increased processing power of all levels of microcomputers will be the increased use of graphics, especially high-resolution graphics. (For more detail, see INPUT's August 1982 report, Business Graphics: Boon or Boondoggle?)

- User needs and awareness will catch up with current PC networking capabilities. This will be aided by the dropping costs of hard disk storage and, possibly, by the introduction of optical memory storage for PCs.

- Traditional hardware manufacturers and mainframe software vendors will have moved into the market in distribution and support roles.

  - They will, however, mainly be resellers or acquire established products from small software houses.

  - It will still be up to individual buyers to determine the worth of new software products.

APPENDIX D: USER QUESTIONNAIRE

INPUT QUESTIONNAIRE

CATALOG. NO. M E P C
SIC. CODE
SIZE CODE
AREA CODE
STUDY CODE
DATES M M D D Y Y

STUDY TITLE:

TYPE OF INTERVIEW: ☐ VENDOR ☐ TELEPHONE
☒ USER ☐ ON-SITE
☐ MAIL

INPUT Interviewer _____ Date _____

Respondent _____

Company _____

Title _____ Phone Number ( ) _____

Address _____

_____

Size Company ($) _____ T/O (or assets) No. of employees _____

INDUSTRY ☐

☐ DISCRETE MANUFACTURING ☐ UTILITIES ☐ INSURANCE
☐ PROCESS MANUFACTURING ☐ RETAIL ☐ GOVERNMENT - FEDERAL
☐ TRANSPORTATION ☐ BANKING ☐ GOVERNMENT - STATE & LOCAL
☐ MEDICAL ☐ WHOLESALE ☐ EDUCATION
☐ SERVICES ☐ OTHER

S T A R T

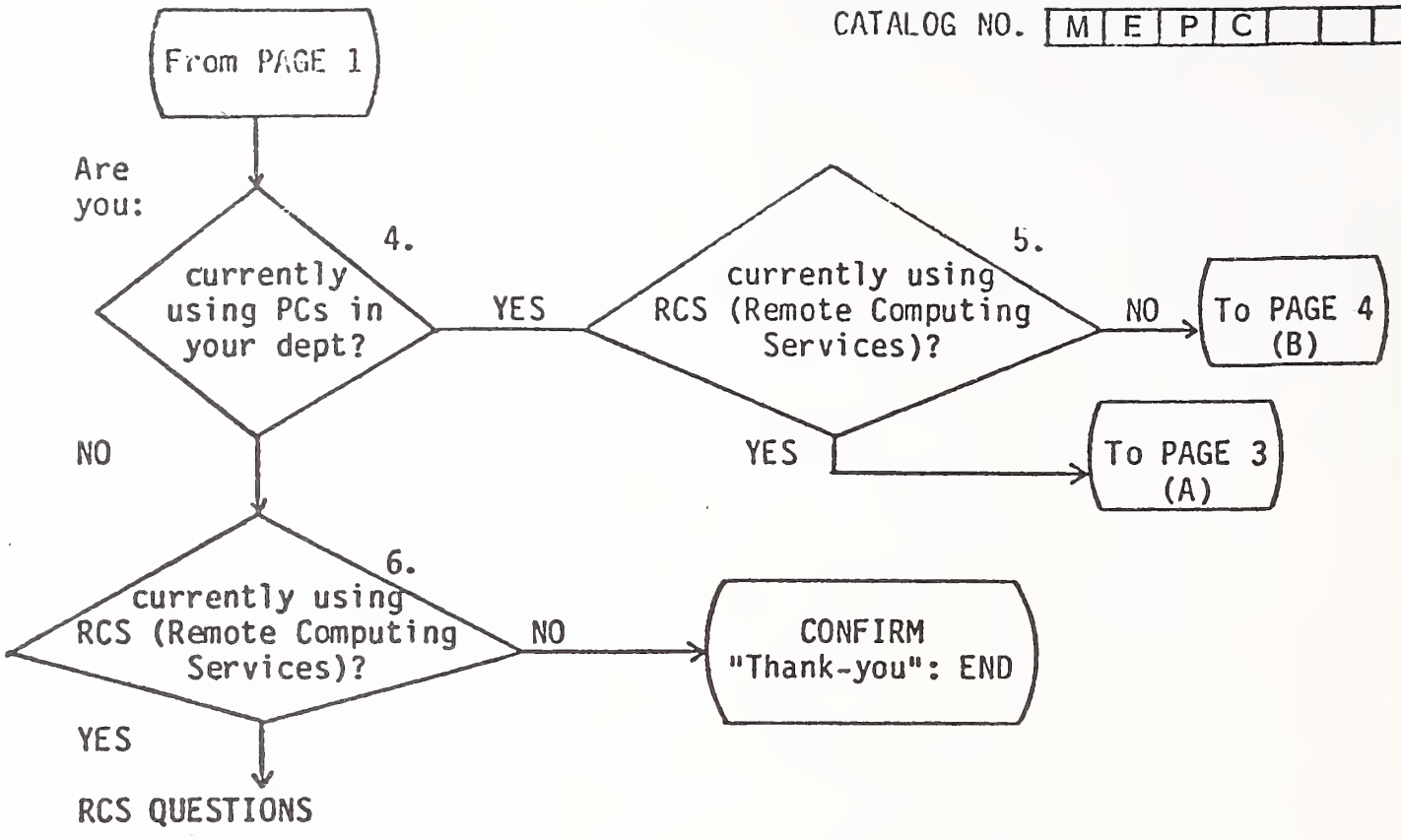
1. In what department do you work? _____

2. What is your job function ? _____

3. Approximately how many people are employed in your department or area?

_____

Continue next page



7. What are the three main applications you are running on RCS?

   a) 1. _____

   b) 2. _____

   c) 3. _____

8. How much are you currently spending per month on RCS services?

   _____

9. Has that increased or decreased in the past year? _____

10. By what percent? _____

11. Do you expect your spending for RCS to increase or decrease in the next 12 months?

    _____

12. By what percent? _____

13. If decrease, what do you expect to replace it? _____

    _____

Continue on PAGE 4 (B)

From Page 2 (A)

RCS QUESTIONS

7. What are the three main applications you are running on RCS?

   a) 1. _____

   b) 2. _____

   c) 3. _____

8. How much are you currently spending per month on RCS services?

   _____

9. Has that increased or decreased in the past year? _____

10. By what percent? _____

11. Do you expect your spending for RCS to increase or decrease in the next 12 months?

    _____

12. By what percent? _____

13. If decrease, what do you expect to replace it? _____

    _____

RCS/PC CONJUNCTION QUESTIONS

If PCs and RCS are used together, details of the services run jointly to fulfil one or more applications:

Regarding that service(s):	(1)	(2)
14. RCS Vendor's name	_____	_____
15. Product name	_____	_____
16. Application	_____	_____
17. Monthly cost	_____	_____
18. Month/year started	_____	_____

DISPLACEMENT/GROWTH QUESTIONS

19. Was/would the replacement or reduction of RCS services be one of the objectives of installing personal computers?

_____

20. When adopting PCs what alternatives did/would you explore?

Other RCS vendor _____

In-house mainframe/mini _____

Small business system _____

Other (specify) _____ _____

21. Did/would your evaluation of alternatives involve a formal cost/benefit analysis?

_____

22. If so, could you quantify the results? _____

_____

23. Please identify in order of importance the three most important factors that weighed/would weigh in the decision to install PCs in place of RCS services in your department.

a) 1. _____

b) 2. _____

c) 3. _____

24. Did/would the introduction of personal computers to your department result in a reduction of your use of RCS services?

_____

25. What percent of your former RCS expenses were/would be eliminated because of your use of PCs?

_____

26. What were/would be the main applications you were running on an RCS basis that you've now replaced or might do with personal computers?

a) 1. _____

b) 2. _____

c) 3. _____

UNIVERSAL QUESTIONS

27. How many personal computers were/are installed in your department:

		One Year Ago		Today
Brands:	a.	_____	b.	_____
	c.	_____	d.	_____
	e.	_____	f.	_____
Total		_____		_____

28. What are the three main applications you are now running on PCs?

a) 1. _____

b) 2. _____

c) 3. _____

29. By what percent will your spending for PCs increase or decrease in the next 12 months?

_____

30. What is the job function of the person in your department who makes the decision to buy personal computers?

_____

31. Rank from 1-5 (1 low, 5 high) the importance you attach to any recommendations, coming from the following sources, on how to buy or not to buy personal computer hardware and software.

Manufacturer	_____
Computer store/dealer	_____
Trade publications	_____
Colleagues/associates (in similar firms)	_____
MIS department	_____
Other (specify)	_____ _____
	_____ _____
	_____ _____

32. On a scale of 1-5 (1 low, 5 high) how would you rate your satisfaction with PCs compared with similar applications run on RCS?

_____

33. In that regard, please identify and rank their two most easily identifiable benefits.

a) 1. _____

b) 2. _____

34. Please identify and rank their two most easily identifiable shortcomings.

a) 1. _____

b) 2. _____

35. Are your company's PCs connected to each other or are they likely to be via:

	Now	Next 12 months
LANs	a. _____	b. _____
RCS	c. _____	d. _____
Host processor	e. _____	f. _____
Other (specify)	g. _____	h. _____

36. What was (or will be) your purpose in interconnecting PCs?

Share common data _____

Share common peripherals _____

Electronic mail _____

Other _____ _____

_____

37. On a scale of 1-5 (1 low, 5 high) please rate the importance over the next 3 years of the following features in your personal computing requirements:

a. _____ Communications within a department

b. _____ Communications with other departments on your site

c. _____ Communications with remote company departments

d. _____ Communications with other companies (clients, distributors, etc.)

e. _____ Access to company-wide data base

f. _____ Access to external data bases

g. _____ Substantial processing power for high-volume transaction requirements (e.g., payrolls, order entry, etc.)

h. _____ Substantial processing power for high-level analytical requirements (e.g., financial modelling, MRP, etc.)

i. _____ Substantial program development capabilities

j. _____ Software downloading capabilities

k. _____ User training provided by vendor

l. _____ Consulting support (system configuration, program development, etc.)

m. _____ Maintenance support provided by vendor

n. _____ Other (specify) _____

_____

_____

_____

38. What future applications, in order of priority, are most important?

a) _____

b) _____

c) _____

39. Are there any applications you would like to run on personal computers but are unable to because of their limited ability?

Application	Limitation
a. _____	b. _____
c. _____	d. _____
e. _____	f. _____

40. Do you know of any other departments or organisations that are now using PCs with or without RCS services?

Company	a. _____	Company	e. _____
Person	b. _____	Person	f. _____
Title	c. _____	Title	g. _____
Phone #	d. ( ) _____	Phone #	h. ( ) _____

41. Are there any comments you would like to make concerning your experience with PCs or RCS services that we haven't discussed?

_____

_____

Confirm name, company, address for Executive Summary forwarding.

Thank you for your time.

Comments/Interviewer Summary: _____

_____

_____

_____

APPENDIX E: VENDOR QUESTIONNAIRE

VENDOR QUESTIONNAIRE

1. Have you lost any revenue in the past year to personal computer use?

_____(Yes/No)

	Yes/No	How Much
To standalones?		
To other companies offering PC/RCS service?		

a) Which applications, in order of importance, have suffered the greatest loss in the past year to PC's?

1) _____

2) _____

3) _____

b) What applications do you feel are most vulnerable to replacement by personal computers in:

Next 12 months?	Next 3 Years?
_____	_____
_____	_____
_____	_____

2. Are you currently offering any products or services specifically designed to combine personal computer use with RCS use? _____(Yes/No)

If not: Do you have any plans to offer such a product or service within the next year? _____(Yes/No)

5. Are you planning for all of these offerings to be sold by:

Present sales force _____

Separate, specialized sales force _____

Distributors _____

Other (specify) _____

_____ _____

Exceptions: Product _____

Sales Channel _____

Product _____

Sales Channel _____

6. What are the 3 most difficult problems you've encountered in selling PC/RCS offerings?

#1) _____

#2) _____

#3) _____

How have you responded to these problems?

#1) _____

_____

#2) _____

_____

#3) _____

_____

7. On a scale of 1 to 5 (1 = low, 5 = high), please rate the importance that the following features have for personal computer based RCS offerings.

_____ Communications within a department

_____ Communications with other departments on users' sites

_____ Communications with remote company departments

_____ Communications with other companies (clients, distributors, etc.)

_____ Access to company-wide data base

_____ Access to external data bases

_____ Substantial processing power for high volume transaction requirements (e.g., payrolls, order entry, etc.)

_____ Substantial processing power for high level analytical requirements (e.g., financial modelling, MRP, etc.)

_____ Substantial program development capabilities

_____ Software downloading capabilities

_____ User training provided by vendor

_____ Consulting (system configuration, program development, etc.)

_____ Maintenance provided by vendor

_____ Other (specify) _____

What applications in order of priority are most important?

1) _____

2) _____

3) _____

8. In addition to what we've already discussed, what actions have you taken to stem the loss of business to personal computers? (Check those that apply.),

_____ Repriced

_____ Repackaged

_____ Retrained sales people

_____ Added new features

_____ Other (specify) _____

_____ _____

_____ _____

9. Is there anything else you'd like to contribute concerning personal computers or their impact on RCS services? _____

_____

_____

_____

_____

_____

10. Could you please send me sales literature on your current PC/RCS offerings?

11. Let me confirm your name and address for forwarding your Executive Summary. The report should be published in September 1983.

12. Thank you for your time.

TARGETS

CURRENT OFFERINGS	Industries Targeted	Applications	Departments Targeted	User Job Function	Size Company Targeted*	1982 Revenues	Percent Revenues From F500	Forecast Revenues	
								1983	1985
Name:									
Name:									
Name:									
PLANNED OFFERINGS									
Name:									
Name:									
Name:									

*1: 500 million (Fortune 500)
2: 100 - 500 million
3: <100 million

NATURE OF PRODUCT

CURRENT OFFERINGS	Hardware Included?	Software Resident or Downloaded?	PC Act as Terminal? Minor* Processing? Major Processing?	Mainframe DB Access a Major- or Minor Component?	Communications Between Company Sites a Major or Minor Component?	Date of Introduction (month/year)
Name:						
Name:						
Name:						
PLANNED OFFERINGS						
Name:						
Name:						
Name:						

* Minor = < 50%

COMPONENTS

CURRENT OFFERINGS	Main PC Hardware Manufacturer	Main PC Software Supplier	Training Supplied (Yes/No)	Maintenance Supplied (Yes/No)	Price Range	Purchase? Rent? Lease?
Name:						
Name:						
Name:						
PLANNED OFFERINGS						
Name:						
Name:						
Name:						

APPENDIX F: RELATED INPUT REPORTS

APPENDIX F: RELATED INPUT REPORTS

- Business Graphics: Boon or Boondoggle?, August 1982.
- Impact of Upcoming Optical Memory Systems, April 1983.
- Opportunities in Financial Planning Systems Markets: 1982-1987.
- Personal Computer Software Market Opportunities, November 1982.
- Personal Computers in the IS Strategy, December 1982.
- Selecting User Friendly Operating Systems for Personal Computers, June 1983.
- Supporting Personal Computer Software, July 1983.
- Personal Computers Versus Word Processors: Resolving The Selection Dilemma, June 1983.
- Personal Computer Opportunities for Remote Computing Services Vendors, June 1983.

APPENDIX G: TABLE OF EXCHANGE RATES

APPENDIX G:

TABLE OF EXCHANGE RATES USED IN THIS REPORT

COUNTRY	ONE DOLLAR EQUALS	
	RATE	UNIT/SYMBOL
France	6.73	Franc FF
Federal Republic of Germany	2.50	Deutschmark DM
United Kingdom	0.62	Pound Sterling £
Italy	1,367.00	Lira L
Sweden	7.29	Kroner SKr
Norway	7.02	Kroner NKr
Denmark	8.37	Kroner DKr
Netherlands	2.62	Guilder Fl
Belgium/Luxembourg	46.75	Franc BF/LF
Austria	16.70	Schilling AS
Switzerland	2.00	Franc SFr
Spain	125.60	Peseta P
Portugal	90.00	Escudo ESc
Finland	5.28	Markka FM
Greece	70.50	Drachma D
Ireland	0.72	Punt PU

SOURCE: Financial Times, London dated 31st December 1982.